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SYNOPSIS
OF
THE SILURIAN FOSSILS
OF
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A SYNOPSIS

OF THE

SILURIAN FOSSILS

OF IRELAND.

PREPARED BY

FREDERICK M'COY,

PROFESSOR OF NATURAL SCIENCE IN THE UNIVERSITY OF MELBOURNE,

FROM THE COLLECTIONS MADE FROM THE SEVERAL DISTRICTS EXAMINED

BY

SIR RICHARD GRIFFITH, BART., LL.D., F.R.S.E., F.G.S., &c. &c.,

AS AT PRESENT LAID DOWN ON HIS GEOLOGICAL MAP OF IRELAND:

WITH

DESCRIPTIONS OF SOME ADDITIONAL SPECIES,

BY

J. W. SALTER, F.G.S.,

OF THE MUSEUM OF PRACTICAL GEOLOGY, JERMYN-STREET, LONDON.

With Five Lithographic Plates.

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NOTICE.

THE following Synopsis of Fossils, collected by me from the several Silurian districts of Ireland, was completed by Mr. M'Coy in the month of May, 1845, but its publication was delayed, in the expectation that, in the intervals of public duty, I should have had leisure to prepare a Memoir descriptive of the Geology of the several localities, and thus render the work more perfect and useful. Unfortunately, I have been disappointed in this expectation, and, in consequence, have determined to print it in its present form.

In the interval which has elapsed between the completion of the Synopsis and the present time, Sir Roderick Murchison's splendid and admirable Work on the Geology of Russia has appeared, and with it the labours of M. de Verneuil and Count Keyserling on the Palæozoic Fossils of Russia, &c., many of which occur in the Irish deposits.

At my request, Mr. M'Coy has revised his Manuscript, and introduced the improvements in nomenclature proposed and adopted by those distinguished Palæontologists.

RICHARD GRIFFITH.

FITZWILLIAM-PLACE, DUBLIN,
April 29th, 1846.

LETTER FROM MR. M'COY TO MR. GRIFFITH.

Dublin, 2nd May, 1845.

SIR,

HAVING completed the examination of your extensive collections of Fossils from the various Silurian districts of Ireland, I beg to present to you the accompanying "Synopsis," containing the names of all the species I have at present determined; the genera being in systematic order, and the species alphabetically arranged in each genus. To render it more useful to the geologist, I have inserted the names of the principal localities in which each fossil has been met with, shewing the mixture, in many places, of species considered characteristic of distinct parts of the series; thus pointing to a more simple division of the Silurian system in Ireland than exists in Wales.

You will perceive that a considerable number of the species have not been previously noticed in the British Silurian rocks, being, however, described in those of Russia, Sweden, and North America.

In addition to those previously known, I have discovered in your collections upwards of seventy species and some generic forms which I believe to be new to science; of those I have made careful drawings, and inserted descriptions in their proper places in the Synopsis. I have also figured a few specimens referrible to *varieties* of rare foreign species, which are noticed under their respective heads.

There still remain some undetermined forms of considerable interest in the collections, most of which are probably new, but which, from the imperfection of the specimens, could not at present be satisfactorily figured or described. I hope, however, the work, as a whole, will be satisfactory to you, and useful to Geology.

ABBREVIATIONS

OF THE

PRINCIPAL AUTHORITIES TO WHICH REFERENCE IS MADE.

BEY.—Beyrich, Ueber einige böhmische Trilobiten.
BLUM.—Blumenbach, Arch. Telluris.
BRONG.—Brongniart, Hist. Nat. des Crustacés Fossiles.
BRONN.—Bronn, Lethæa Geognostica.
BUCH.—Von Buch, Über Cystideen.
BUCK.—Buckland, Bridgewater Treatise.
BURM.—Burmeister, Organisation und Uebersicht der Trilobiten.
CONRAD.—Conrad, Jour. Acad. Nat. Science of Philadelphia, vol. VIII.—*Id.* Geol. Report, New York.
DAL.—Dalman, Über die Paläaden.—*Id.* Terebratuliter, &c.
EMMERICH.—Neues Jahrbuch für Mineral. Geol. und Petrefactenkunde, 1845. (Morphology, &c., of Trilobites.)
EMMONS.—Geol. Report, New York (Second District).
GOLD.—Goldfuss, Petrefacta Germaniæ.—*Id.* Nova Acta Academiæ Cæs. Leop. Cur. Nat. t. 19.
GREEN.—Green, Monograph of the Trilobites of North America.
HALL.—Hall, Geol. Report, New York (Fourth District).
HIS.—Hisinger, Lethæa Suecica.
KÖNIG.—König, Icones fos. Sectiles.
LONSD.—Lonsdale in Murchison's Silurian System.
MÜNST.—Münster, Beiträge zur Petrefactenkunde.
MURCH.—Murchison, Silurian System.
PAND.—Pander, Beiträge zur Geognosie des Russischen Reiches.
PHIL.—Phillips, Palæozoic Fossils.
PORTK.—Portlock, Geol. Report on Londonderry, &c.
ROEM.—Roemer, Die Versteinerungen des Harzgebirge.
SCHLOT.—Schlotheim, Petrefactenkunde.—*Id.* Nachträge zur Petrefactenkunde.
SOW.—Sowerby, in Murchison's Silurian System.—*Id.* Geol. Trans. of London.—*Id.* Mineral Conchology.
VANUXEME.—Vanuxeme, Report of the Survey of the Third Geological District of New York.
VER.—De Verneuil and Count Keyserling, Palæontology (2nd vol.) of Murchison's Geol. of Russia, &c.—*Id.* and Viscount d'Archiac, Fossils of the Rhenish Provinces, Geol. Trans. vol. VI.
WAHL.—Wahlenberg, Petrificata Telluris Suecanæ, Nova Acta Reg. Soc. Sc. Upsal, t. viii.

SYNOPSIS,

&c. &c.

PISCES.

Acanthalepis Jamesii. *M'Coy.* (Pl. I. fig. 1, 2).

Etym. ἄκανθα, aculeus, and λεπὶς, squama.

I have provisionally given the generic name *Acanthalepis* to certain scales occurring in the shale N. of Newtown Head, in the County Waterford, having about the age of the Caradoc sandstone. They are, I believe, the most ancient remains of fishes yet noticed.

In general form and structure those scales agree precisely with the bony, spinose plates on the sides of the Sturgeons, with which they may be compared. They are somewhat rounded, with five or six angles, and having four, or sometimes five, strong, rounded ridges from the margin, which meet near the centre, forming a sharp, prominent, thorn-like spine, from which the genus derives its name. The substance of the scale is rather thick and strong; one-half or two compartments of the surface being marked with short radiating striæ; the other half very minutely granulated, most usually appearing nearly smooth. Length four to four and a half lines.

Emmons, in the Geological Report of the Second District of New York, p. 179, fig. 3, notices a fossil apparently identical with this, as probably part of a Crinoid; and Pander, in his "Beiträge," figures a nearly similar specimen as probably part of a Sphæronite. The plates of these creatures are, however, for obvious reasons, bounded by right lines, to allow of their edges fitting accurately without overlapping, which is not the case with the plates or scales under consideration; and one-half of the surface being striated, and the other half granulated, as in these examples, is a mode of marking incompatible with the organization of an Echinoderm.

I have dedicated this species to Captain James, R. E., Local Director of the Geological Survey of Ireland, who was the first to point out the fossiliferous nature of the strata of nearly the same age in the adjoining locality at Tramore.

CEPHALOPODA.

Orthoceras acuarium. *Münst.*

Ref.—Beïtr. zur Pet. heft. 3, taf. 17, fig. 5.

Locality.—Common in the grey calcareous sandstones of Blackwater Bridge, Leenane, County Galway.

Orthoceras approximatum. *Sow.*

Ref.—Sil. Syst. Pl. 21, fig. 22.

Locality.—Rare in the grey sandstones of Lettershanbally, Clifden, County Galway.

Orthoceras breviconicum. *Portk.*

Ref.—Geol. Rep. Pl. 28, fig. 8.

Locality.—Rare in the schists of Tirnaskea, Pomeroy, County Tyrone.

Orthoceras bullatum. *Sow.*

Ref.—Sil. Syst. Pl. 5, fig. 29.

Locality.—Rare in the greenish slates of Ferriter's Cove, Dingle, County Kerry. In the sandstones at Boocaun, Cong, County Galway.

Orthoceras coralliformis. *M'Coy.* (Pl. I. fig. 3).

Sp. Ch.—Elongate-conic, gradually tapering; septa convex, about two lines apart; siphuncle excentric; section broad oval; surface with about thirty strong, longitudinal striæ, rather less than a line apart, having between them finer intermediate longitudinal striæ, crossed by strong, undulating, transverse lamellæ, from one and a half to two lines apart, and having five or six fine, undulating, transverse striæ between them.

This beautiful shell differs from the *O. fimbriatum* in the excentric position of the siphuncle, also in some minor points in the striation of the surface. It differs from the *O. angulatus*, His., and from the *O. virgatum*, Sow., as figured and described in the Silurian Researches, in having the intervening striæ between the principal grooves, and in its strong transverse lamellæ. When found (as is most usually the case) as hollow casts of the external surface in sandstone, it so exactly represents the casts of *Cyathophyllum* or *Amplexus*, that a person might at first be deceived, and take it for a coral. Section: long diameter, one inch four lines; short diameter, one inch one line; siphuncle five lines from one side, one and a half lines in diameter. Small specimens, imperfect at both ends, one inch nine lines in length, and having a diameter of seven lines, taper one line; septa two lines apart.

Locality.—Common in the grey sandstone of Blackwater Bridge, Leenane, County Galway; occurs in great abundance in the sandstone of Lettershanbally, Clifden, County Galway; common in the dark schists of Tullyconnor, Leenane, County Galway.

Orthoceras elongatocinctum. *Portk.*

Ref.—Geol. Rep. Pl. 27, fig. 2.

Locality.—Not uncommon in the fine, black, Graptolite slates of Limehill, Pomeroy, County Tyrone; common in the coarse schists of Tirnaskea, Pomeroy, County Tyrone.

Orthoceras filosum. *Sow.*

Ref.—Sil. Syst. Pl. 9, fig. 3.

Locality.—Common in the schists of Tullyconnor, Leenane, County Galway.

Orthoceras gregarium. *Sow.*

Ref.—Sil. Syst. Pl. 8, fig. 16.

Locality.—Common in the light grey subcrystalline limestone of Chair of Kildare, Kildare, County Kildare; in dark schists at Tullyconnor, Leenane, County Galway.

Orthoceras ibex. *Sow.*

Ref.—Sil. Syst. Pl. 5, fig. 30.—(Syn. O. annulatus. *His.*)

Locality.—Rare, but of large size in the grey slate of Coolin, Cong, County Galway.

Orthoceras imbricatum. *Wahl.*

Ref.—His. Leth. Suec. Pl. 9, fig. 9.

Locality.—Rare in the greenish slates of Ferriter's Cove, Dingle, County Kerry.

Orthoceras lineare. *Münst.*

Ref.—Orthoceratites linearis. Münst. Beïtr. zur Pet. heft 3. Pl. 19, fig. 1.

Locality.—In the shale of Chair of Kildare, Kildare, County Kildare.

Orthoceras lineatum. *His.*

Ref.—Leth. Suec. Pl. 9, fig. 6.

Locality.—Common in the grey calcareous slates resting on the traps at Glencraff, Leenane, County Galway; common in the slate at Tullyconnor, Leenane, County Galway.

Orthoceras regulare. *Schlot.*

Ref.—Petrefacten. Pl. 9, fig. 3.

Locality.—Rare in the slates of Egool, Ballaghaderreen, County Mayo; common in the dark schists of Lisbellaw, County Fermanagh; common at Tirnaskea, Pomeroy, County Tyrone.

Orthoceras semipartitum. *Sow.*

Ref.—Sil. Syst. Pl. 3, fig. 9.

Locality.—Common in the grey (weathering brown) indurated sandstone or quartzite of Tonlegee, Cong, County Galway.

Orthoceras striatopunctatum. *Münst.*

Ref.—Beïtr. zur Pet. heft. 3, taf. 20, fig. 1.

Locality.—Not uncommon in the slates of Glencraff, Leenane, County Galway.

Orthoceras subgregarium. *M'Coy.* (Pl. I. fig. 4).

Sp. Ch—Very gradually tapering; section round, or very slightly compressed; septa moderately convex, about one line and a half apart, with a diameter of six lines; siphuncle a continuous tube, excentric; a specimen, imperfect at both ends, one and a half inches long, and six lines in diameter at the base, tapers one line.

I have not seen the surface of this species distinctly, but it is probably smooth. It much resembles the *O. venusta*, Münst., and *O. gracilis*, Blum., but tapers much less rapidly than those species, and has the septa more numerous and closer; which latter character also distinguishes it from the *O. duplex*, Wahl., and *O. communis*, His.; the latter, which it most resembles, also differs in its circular section, and perfectly lateral siphuncle; from the *O. gregarium*, Sow., which it resembles exactly in form and distance of septa, it is easily distinguished by its nearly lateral siphuncle (central in the former species).

Locality.—In the calcareous slates of Ardaun, Cong, County Galway; common in the grey calcareous sandstone of Boocaun, Cong, County Galway; Munterowen, Leenane, County Galway, in grey calcareous sandstone; in the grey quartzites of Shanballymore, Cong, County Galway; very common in the sandstone of Tonlegee, Cong, County Galway.

Orthoceras subundulatum. *Portk.*

Ref.—Geol. Rep. Pl. 28, fig. 2.

Locality.—Rare in the schists of Tirnaskea, Pomeroy, County Tyrone.

Orthoceras tenuicinctum. *Portk.*

Ref.—Geol. Rep. p. 371.

Locality.—Rare in the slates of Carrickadaggan, New Ross, County Wexford; in grey calcareous slates at Glencraff, Leenane, County Galway; in the grey quartzites of Lettershanbally, Maume, County Galway.

Orthoceras tumidum. *Portk.*

Ref.—Geol. Rep. Pl. 28, figs. 5, 6.

Locality.—Rare in the slates of Tirnaskea, Pomeroy, County Tyrone.

Poterioceras(*a*) approximatum. *M'Coy.* (Pl. I. fig. 5).

Sp. Ch.—Elongate oval, slightly compressed; septa oblique, very approximate, rather less than a line apart in a specimen nine lines in diameter. Diameter at last chamber nine lines; length of specimen, imperfect at both ends, one inch two lines. The approximation of the septa distinguishes this from every other of the genus with which I am acquainted.

Locality.—Rare in the sandstone of Killey, Pomeroy, County Tyrone.

Coleoceras. *Portk.*

The fossils which Capt. Portlock has grouped under this generic name are not uncommon in the Pomeroy schists. The *C. Ballii* is abundant, but it seems doubtful whether it should not be referred to *Murchisonia* rather than to any of the Cephalopoda, it being without chambers, and having the spiral form and mesial band of that genus; the other species seem true Cephalopods, referrible to the genus *Orthoceras*, the investing sheath, both in the case of the Gasteropod and the Cephalopod, being possibly a parasite allied to the recent *Halicondria suberica*, a sponge which invests old univalve shells on our shores at the present day in a precisely similar manner. *Orthoceras regulare* and *O. speciosum*, when coated near the apex with the same body, seem to become referrible to the *Coleoceras pseudo-regulare* and *C. pseudo-speciosum* of Captain Portlock's work.

The above views were the result of my examination of specimens collected by Mr. Griffith from the Pomeroy district prior to the publication of Capt. Portlock's valuable work; but from the materials at my disposal I should have hesitated to put forward my opinion, were it not that Capt. Henry James, R. E., had independently come to a nearly similar conclusion, from the examination of the identical specimens described by Capt. Portlock, in the Ordnance Collection. The following is an abstract from a letter of Capt. James, written in 1843: "I find that the envelope which has been described as part of, and the essential characteristic of these fossils is, in the two species, *Koleoceras pseudo-regulare* and *K. pseudo-speciosum*, nothing more than a zoophyte enveloping common Orthoceratites; and that in the third species, *Koleoceras Ballii*, it is the same zoophyte surrounding and enveloping common univalves; and it is highly probable that one of the fossils which has been figured in Plate XXVII. A. fig. 26, is the same fossil figured by Mr. Murchison, in his great work on the Silurian System, Plate V. fig. 26, the *Pleurotoma Coralli;* but the structure of the Irish specimens is so far obliterated, that the specific character of the parasitic zoophyte cannot be determined with certainty."

It will be thus seen, that Capt. James' view (in which, I believe, he is joined by Professor Phillips) agrees with mine in the main point of the sheath of the Coleoceratites being parasitic, while we differ as to the systematic position of the parasite; he referring to the *Alveolites fibrosa*, which so frequently envelopes the shells of the *Turbo coralli*, *Pleurotoma coralli*, and other fossils of the Ludlow rocks, while I feel inclined to refer to the *Halicondria* as an analogue, from not having seen distinct traces of tubes in any of the specimens at my command.

(*a*) For the genus *Poterioceras*, M'Coy, see "Synopsis of the Characters of the Carboniferous Fossils of Ireland," p. 10.

BELLEROPHON BILOBATUS. *Sow.*

Ref.—Sil. Syst. Pl. 19, fig. 13.

Locality.—Very common in the slates of Tirnaskea, Pomeroy, County Tyrone; in the dark slate of Tullyconnor, Leenane, County Galway.

BELLEROPHON CARINATUS. *Sow.*

Ref.—Sil. Syst. Pl. 3, fig. 4.

Locality.—Not uncommon in the sandstone of Tonlegee, Cong, County Galway.

BELLEROPHON DILATATUS. *Sow.*

Ref.—Sil. Syst. Pl. 12, fig. 23.

Locality.—In the grey slates of Boocaun, Cong, County Galway; in the slates of Coolin, Cong, County Galway; common, and of large size, in the greenish grey slates of Egool, Ballaghaderreen, County Mayo.

BELLEROPHON ELONGATUS. *Portk.*

Ref.—Geol. Rep. Pl. 29, B. fig. 4.

Locality.—This fossil, which seems to be a mere variety of the *B. bilobatus*, is common in the schists of Tirnaskea, Pomeroy, County Tyrone.

BELLEROPHON EXPANSUS. *Sow.*

Ref.—Sil. Syst. Pl. 5, fig. 32.

Locality.—Common in the sandstone of Tonlegee, Cong, County Galway.

BELLEROPHON GIBBUS. *Portk.*

Ref.—Geol. Rep. Pl. 29, fig. 5.

Locality.—This variety, which does not seem to differ materially from young individuals of the *B. bilobatus*, is common in the slates of Tirnaskea, Pomeroy, County Tyrone.

BELLEROPHON TRILOBATUS. *Sow.*

Ref.—Sil Syst. Pl. 3, fig. 16.

Locality.—Common in the sandstone of Boocaun, Cong, County Galway; in the grey slates of Cappacorcogue, Cong, County Galway; in the sandstones at Lettershanbally, Maume, County Galway; very common in the sandstone of Tonlegee, Cong, County Galway.

GASTEROPODA.

TURRITELLA CONICA. *Sow.*

Ref.—Sil. Syst. Pl. 3, fig. 7 b, 8.

Locality.—Not uncommon in the sandstone of Lettershanbally, Maume, County Galway.

Turritella gregaria. *Sow.*

Ref.—Sil. Syst. Pl. 3, fig. 1.

Locality.—Common in the sandstone of Tonlegee, Cong, County Galway.

Turritella obsoleta. *Sow.*

Ref.—Sil. Syst. Pl. 3, fig. 7, a.

Locality.—Abundant in the grey quartzite of Lettershanbally, Maume, County Galway; in the sandstone of Boocaun, Cong, County Galway; in the black schists of Tullyconnor, Leenane, County Galway.

Turritella plana. *M'Coy.* (Pl. I. fig. 6).

Sp. Ch.—Subulate, smooth; spire of numerous flat whorls, each about twice as broad as deep.

This species has probably about eight or nine whorls in the spire when perfect; the imperfect specimens I have seen only shew six. It is known from its congeners by the flatness of the whorls of the spire. Length, when perfect, probably ten lines, width at base four lines, depth of last whorl two and a half lines.

Locality.—Not common in the sandstone of Tonlegee, Cong, County Galway.

Turbo concinnus. *M'Coy.* (Pl. I. fig. 7).

Sp. Ch.—Ovate; spire very small, pointed, of two tumid, convex whorls; body whorl twice as long as the spire, obscurely angulated in the middle; umbilicus very small, rounded, deep; mouth orbicular, slightly pointed retrally; surface entirely smooth; no pillar lip.

This little shell resembles the recent (Gasteropod) genus *Margarita*, and should, probably, be placed with it. The spire is short, but sharply pointed, and composed of two distinct convex whorls. The species resembles the *Natica Kassiana*, Wissm., but is distinguished by its smaller and obtusely angular body whorl; and from a number of somewhat similar Palæozoic shells, by the small but distinct umbilicus, and the structure of the pillar. Length of the largest specimen two lines, width two lines; length of mouth slightly more than one line.

Locality.—Rare in the slate of Carrickadaggan, New Ross, County Wexford.

Turbo tritorquatus. *M'Coy.* (Pl. I. fig. 8).

Sp. Ch.—Obliquely conical; spire acute, as long as the mouth, of three very convex whorls; basal whorl, and base convex; umbilicus minute; mouth nearly orbicular; (surface smooth?).

This species is distinguished from the *Turbo concinnus*, M'Coy, which it most resembles, by the greater height and size of the spire, and differs from the *Cyclostoma pervetusta*, Conrad, of the Medina sandstone, in its small umbilicus. Length three lines; width three lines; length of spire one and a half lines; length of mouth one and a half lines.

Locality.—Common in the sandstone of Boocaun, Cong, County Galway; very common in the sandstone of Tonlegee, Cong, County Galway; rare in the shale of the Chair of Kildare, Kildare, County Kildare.

Turbo trochleatus. *M'Coy.* (Pl. I. fig. 9).

Sp. Ch.—Subglobose; spire small, acute, of three whorls; sutures deeply channelled, the groove surrounded by a raised margin or keel; body whorl with two prominent keels in the middle, having between them a broad, concave space; only one of these mesial keels, and the sutural one, on the turns of the spire; base convex, umbilicus small, rounded; mouth rounded.

This strongly-marked shell, with its deeply canaliculated sutures, and broad, pulley-like mesial groove, bounded by its prominent keels, is not likely to be confounded with any other; the surface is not sufficiently

clear to distinguish the striæ, if any existed. Length four lines, width five lines, height of spire one and a half lines.

Locality.—Common in the sandstone of Boocaun, Cong, County Galway; Cappacorcogue, Cong, County Galway; Tonlegee, Cong, County Galway.

NATICOPSIS(?) CONCINNA. *M'Coy.* (Pl. I. fig. 10).

Sp. Ch.—Obliquely ovate; spire half the length of the body whorl, of three or four tumid whorls, slightly concave beneath the sutures; sutures slightly imbricating, sharply plicated; surface obliquely marked with fine, sharp striæ.

This fossil seems much allied to the Wenlock limestone shell, called (erroneously, I think) *Nerita spirata*, in the Silurian Researches; it seems distinct by its larger spire, and is certainly different from the carboniferous *N. spirata.* Length of small specimen ten lines; of body whorl seven lines; width nine lines. Many specimens twice this size.

Locality.—Very abundant in the limestone of Chair of Kildare, Kildare, County Kildare.

NERITA HALIOTIS. *Sow.*

Ref.—Sil. Syst. Pl. 12, fig. 16.

Locality.—Rare in the slates of Doonquin, Dingle, County Kerry.

CYRTOLITES(*a*) BUCKLANDI. *Portk.* SP.

Ref.—Ecculiomphalus Bucklandi. *Portk.* Geol. Rep. Pl. 30, fig. 10.

Locality.—Rare in the grey quartzite of Shanballymore, Outerard, County Galway; common in the coarse schists of Tirnaskea, Pomeroy, County Tyrone.

CYRTOLITES MINOR. *Portk.* SP.

Ref.—Ecculiomphalus minor. *Portk.* Geol. Rep. Pl. 30, figs. 11, 12.

Locality.—Common in the schists of Tirnaskea, Pomeroy, County Tyrone.

EUOMPHALUS ALATUS. *His.*

Ref.—Leth. Suec. Pl. 11, fig. 7.

Locality.—Common in the slates of Doonquin, Dingle, County Kerry; in the slates of Ferriter's Cove, Dingle, County Kerry.

EUOMPHALUS FUNATUS. *Sow.*

Ref.—Min. Con. Pl. 450, figs. 1, 2.

Locality.—In the slates of Ferriter's Cove, Dingle, County Kerry; in the dark schists of Tullyconnor, Leenane, County Galway.

EUOMPHALUS(?) FURCATUS. *M'Coy.* (Pl. I. fig. 11).

Sp. Ch.—Discoid, compressed, of three or four rounded whorls, which are entirely exposed in a shallow, wide umbilicus, with steep sides; surface crossed with extremely numerous, fine, rounded ridges, which, arising from within the umbilicus, branch as they pass over its narrow, rounded margin.

A few obscure and, perhaps, deceptive traces of a keel, render it probable that this diminutive shell should be referred to *Goniatites;* the specimens being apparently equally dished on both sides, would likewise seem to

(*a*) Generic name proposed by Conrad for this group of fossils in 1838, five years previous to the publication of Capt. Portlock's name, *Ecculiomphalus.*

favour this view; the rarity, however, of that genus in the lower Palæozoic strata, makes me prefer leaving it in *Euomphalus* for the present. Diameter two lines.

Locality.—Not uncommon in the shale of Greenville, Enniscorthy, County Wexford.

Euomphalus lautus. *M'Coy.* (Pl. I. fig. 12).

Sp. Ch.—Depressed, conical, of four subquadrate or rounded whorls, each having a deep, concave space just below the sutures; umbilicus large, rounded; mouth nearly round; surface ornamented with a great number of concentric ridges, about sixteen on the basal whorl, alternately larger and smaller, the intervening spaces being flat or slightly concave; the entire surface crossed with strong, erect, waving, scaly laminæ.

This magnificent shell is allied to the *E. rugosus* of the Wenlock limestone, but is easily distinguished by the great number of the concentric ridges; in some specimens the intermediate smaller ridges are not seen. Diameter one inch eleven lines; height of spire eleven lines; height of mouth nine lines.

Locality.—Occurs in extraordinary abundance in the shale at Ferriter's Cove, Foylathurrig, and Doonquin, Dingle, County Kerry.

Euomphalus perturbatus(?). *Sow.*

Ref.—Sil. Syst. Pl. 22, fig. 15.

Locality.—Rare in the slates of Greenville, Enniscorthy, County Wexford.

Euomphalus sculptus. *Sow.*

Ref.—Sil. Syst. Pl. 12, fig. 17.

Locality.—Common in the calcareous slates of Glencraff, Leenane, County Galway; very common in the schists of Tullyconnor, Leenane, County Galway.

Euomphalus subcarinatus. *Münst.*

Ref.—Beitr. zur Pet. heft. 3, taf. 15, fig. 5.

Locality.—Common in the sandstone of Boocaun, Cong, County Galway; in the sandstone of Cappacorcogue, Cong, County Galway.

Euomphalus subsulcatus. *His.*

Ref.—Leth. Suec. Pl. 11, fig. 10.

Locality.—Common in the limestone of Chair of Kildare, Kildare, County Kildare; common in the schist at Tirnaskea, Pomeroy, County Tyrone.

Euomphalus tenuistriatus. *Sow.*

Ref.—Sil. Syst. Pl. 22, fig. 14.

Locality.—Very rare in the slates at Doonquin, Dingle, County Kerry.

Euomphalus tricinctus. *M'Coy.* (Pl. I. fig. 13).

Sp. Ch.—Conical, of about three whorls; volutions rounded; very obliquely and finely striated across; basal whorl, with one narrow, prominent keel surrounding the suture, one similar in the middle of the volution, another at the base, and a fourth encircling the umbilicus; on the other whorls there is one narrow keel in the middle, one at the suture above, and one at the base.

This beautiful shell closely resembles the *Turbo carinatus*, Sow., in some of its characters, but has much fewer keels; that shell having three keels in the middle of each of the smaller whorls, and exclusive of the suture, while the present shell has but one in the middle; the basal whorl has a still greater number, besides

which, the intermediate transverse striæ are much more oblique and finer in the present shell; it is, on the whole, more nearly allied to the *Euomphalus funatus*, Sow., and *E. subsulcatus*, His., but is easily distinguished by the small number of keels, and small umbilicus. Diameter of last whorl nine lines; depth of last whorl four lines; keels one and a half lines apart.

Locality.—Not uncommon in the grey sandstone of Lettershanbally, Leenane, County Galway.

Trochus ellipticus. *His.*

Ref.—Leth. Suec. Pl. 11, fig. 1.

Locality.—In the slates of Egool, Ballaghaderreen, County Mayo; common in the sandstone of Tonlegee, Cong, County Galway.

Trochus helicites. *Sow.*

Ref.—Sil. Syst. Pl. 3, figs. 1, *e.* 5.

Locality.—Common in the calcareous sandstone of Muntrowen, Leenane, County Galway; common in the sandstone of Tonlegee, Cong, County Galway.

Trochus multitorquatus. *M'Coy.* (Pl. I. fig. 14).

Sp. Ch.—Acutely conical, of about seven very gradually increasing whorls, which are rounded, and with a deep separating line in the cast, but nearly flat, and with the lower suture prominent in the perfect shell, the circumference of the basal whorl being obtusely angular; umbilicus moderate deep, rounded; surface smooth; base flat.

This shell is extremely like the *Trochus helicites*, Sow., but is easily known by having nearly double the number of whorls in the spire, and perfectly flat base. Height of largest specimen eleven lines; height of basal whorl two lines and a half.

Locality.—Very common in the decomposing sandstone of Boocaun, Cong, County Galway; abundant in the calcareous slates of Cappacorcogue, Cong, County Galway; common in the sandstone of Lettershanbally, Leenane, County Galway; very common in the sandstone of Tonlegee, Cong, County Galway.

Pleurotomaria angulata. *Sow.*

Ref.—Sil. Syst. Pl. 21, fig. 20.

Locality.—Rare in the slates at Carrickadaggan, New Ross, County Wexford.

Pleurotomaria inflata. *M'Coy.* (Pl. I. fig. 15).

Sp. Ch.—Acutely conical; spire lengthened, rather longer than the aperture, of about five very convex, distinctly separated whorls, each having in the middle a broad, flattened band; base convex; umbilicus small, rounded.

In its very convex, rounded whorls, this species more resembles a *Turbo* than a *Pleurotomaria*; the mesial band is, however, so distinct, that although, from the nature of the rock, the striation of the surface cannot be ascertained, I have no doubt in placing it in that genus. It is much shorter than the *Loxonema obscura*, Portk., which it otherwise resembles; the breadth of the band distinguishes it from the sharp, spiral line of the *Turbo lineatus*, Hall; the *Pleurotoma* (*Murchisonia*) *coralii*, Sow., is a much more slender and elongate shell. Length seven lines, width six lines; length of mouth three lines and a half.

Locality.—Common in the sandstone of Tonlegee, Cong, County Galway.

Pleurotomaria latifasciata. *M'Coy.* (Pl. I. fig. 16).

Sp. Ch.—Conical, spire acute, of four whorls; length and width equal; whorls of the spire slightly convex; basal whorl equal to the rest of the spire in depth, having a very broad, flat, submesial band, equal in

width to the preceding whorl, and bounded above and below by a narrow, elevated ridge; a similar ridge marks the sutures above; base flattened.

The striation of the surface of this small species cannot be distinctly made out; the species, is, however, very distinct from all the others: from the *Turbo bicarinatus* (His.) it differs in its much shorter spire. Length two lines; width the same.

Locality.—Rare in the coarse schist of Pomeroy County Tyrone.

Pleurotomaria trochiformis. *Portk.*

Ref.—Geol. Rep. Pl. 30, fig. 9.

Locality.—Rare in the soft greenish slates of Ferriter's Cove, Dingle, County Kerry; common in the schists of Tirnaskea, Pomeroy, County Tyrone.

Pleurotomaria turrita. *Portk.*

Ref.—Geol. Rep. Pl. 30, fig. 7.

Locality.—Common in the slates of Tirnaskea, Pomeroy, County Tyrone.

Murchisonia articulata. *Sow.* sp.

Ref.—Pleurotoma articulata. *Sow.* Sil. Syst. Pl. 5, fig. 5.

Locality.—In the sandstone of Tonlegee, Cong, County Galway.

Murchisonia bicincta. *M'Coy.* (Pl. I. fig. 17).

Sp. Ch.—Very elongate; acutely pointed; spire of about nine gradually increasing whorls, which are very convex, and deeply separated from each other; each whorl has a narrow, slightly concave band *below* the middle, bounded by two delicate spiral keels.

Only one specimen of this little shell has occurred in the limestone of Chair of Kildare, Kildare, County Kildare. Length three lines.

Murchisonia cingulata. *His.* sp. (?)var. (Pl. I. fig. 18).

The specimen figured differs from the species to which I have referred it, as figured by Hisinger, and Count Keyserling and M. de Verneuil, in its less definite band and prominent sutures; the figure is given for comparison.

Locality.—Not uncommon in the slates of Cappacorcogue, Cong, County Galway; rare in the grey calcareous slates of Kilbride, Cong, County Galway.

Murchisonia corallii. *Sow.* sp.

Ref.—Pleurotoma corallii. Sil. Syst. Pl. 5, fig. 26.

Locality.—Rare at Knockmahon, Tramore, County Waterford.

Murchisonia pulchra. *M'Coy.* (Pl. I. fig. 19).

Sp. Ch.—Ovate; spire pointed, of five prominent whorls, each having a strong angle or keel in the middle, and one fine, thread-like keel at the suture above; on the basal whorl is one fine, thread-like keel below the principal medial one; surface marked with fine, close, irregular, imbricating lines of growth, arched back-

wards from the sutures to the keel, where they form a deep, rounded sinus, and from whence they descend with a slight obliquity.

In this beautiful species the striæ are fine and irregular, both in thickness and distance; in some specimens the principal central keel seems replaced by three fine, close ones, occupying the same space. Length seven lines; width of last volution four lines; length of do. five lines.

Locality.—Very common in the grey slate resting on the trap at Glencraff, Leenane, County Galway.

Murchisonia sulcata. *M'Coy.* (Pl. I. fig. 20).

Sp. Ch.—Elongate turreted; volutions tumid; obtusely carinated in the middle, where there is a distinct, square, but not very prominent, keel; entire shell spirally sulcated; sulci extremely irregular in size and approximation, crossed by occasional, faint lines of growth both above and below, arched obliquely backwards to the keel, which they meet at a very acute angle.

The specimen which has occurred of this species is imperfect, shewing only two whorls; it is, however, very distinct from any other species of those rocks. Length of last whorl one inch; width one inch five lines.

Locality.—Very rare in the shale of Egool, Ballaghaderreen, County Mayo.

Mya rotundata. *Sow.*

Ref.—Sil. Syst. Pl. 6, fig. 1.

Locality.—Rare in the calcareous slates of Ardaun, Cong, County Galway; not uncommon in the greenish slates of Ferriter's Cove, Dingle, County Kerry.

Sanguinolites obovata. *Münst.* sp.

Ref.—*Sanguinolaria obovata*, Beitr. Heft. 3, pl. 12, fig. 29.

Locality.—Rare in the dark, greenish grey slate of Egool, Ballaghadereen, County Mayo.

Pleurorynchus. N. S.

A single, imperfect specimen, referrible to this genus, but apparently of an undescribed species, has occurred in the greyish slates of Ardaun, Cong, County Galway.

Lucina bulla. *M'Coy.* (Pl. II. fig. 1).

Sp. Ch.—Orbicular, gibbous, width slightly exceeding the length; beak small, acute, oblique, one-third the width from the anterior side; muscular impressions two, small, broadly ovate, remote.

This little species abounds in the sandstone of Tonlegee, Cong, in the state of casts; I am not sure whether the anterior muscular impression is elongated or not; I, however, think it is; the pallial impression seems entire; the hinge teeth agree with *Lucina*. Length five lines, width five and a half lines; depth of one valve one and a half lines.

Psammobia rigida. *Sow.*

Ref.—Sil. Syst. Pl. 8, fig. 3.

Locality.—Rare in the dark schists of Tullyconnor, Leenane, County Galway.

Pullastra speciosa. *M'Coy.* (Pl. II. fig. 2).

Sp. Ch.—Transversely subtrigonal, diagonally convex; length two-thirds the width; beaks small, prominent, rather less than one-third the width from the anterior end; anterior side narrow, rounded; posterior side

very broad, subtruncate, with the angles rounded; front margin straight, and nearly parallel with the hinge-line; surface marked with fine, regular, equidistant, concentric, elevated striæ.

This pretty shell resembles the *P. antiqua*, Sow., of the Marwood sandstone, but is easily distinguished by its broad, subtruncate, posterior side. Length seven lines, width eleven lines.

Locality.—Common in the sandy schists of Bardahessiagh, Pomeroy, County Tyrone.

Cardiola interrupta. *Sow.*

Ref.—*Cardium cornucopiæ.* Gold. Pet. Germ. Pl. 143, fig. 1.

Locality.—Rare in the green slates of Ferriter's Cove, Dingle, County Kerry.

Modiola expansa. *Portk.*

Ref.—Geol. Rep. Pl. 33, fig. 6.

Locality.—Not uncommon in the sandy slates of Bardahessiagh, Pomeroy, County Tyrone; common in the coarse schists of Tirnaskea, Pomeroy, County Tyrone.

Modiola securiformis. *Portk.*

Ref.—Geol. Rep. Pl. 33, fig. 8.

Locality.—Rare in the slates of Tirnaskea, Pomeroy, County Tyrone.

Modiola semisulcata(?). var. *Sow.*

Ref.—Sil. Syst. Pl. 8, fig. 6.

Locality.—Not uncommon in the calcareous slates of Ardaun, Cong, County Galway; rare in the grey, calcareous slates of Kilbride, Cong, County Galway; rare in the sandstone of Tonlegee, Cong, County Galway; in the dark grey schists of Tullyconnor, Leenane, County Galway.

Cypricardia cymbæformis. *Sow.*

Ref.—Sil. Syst. Pl. 3, fig. 10 *a*.

Locality.—Rare in the slates of Ardaun, Cong, County Galway.

Cypricardia impressa(?). *Sow.*

Ref.—Sil. Syst. Pl. 5, fig. 3.

Locality.—Very rare in the sandstone of Boocaun, Cong, County Galway.

Cypricardia solenoides(?). *Sow.*

Ref.—Sil. Syst. Pl. 8, fig. 2.

Locality.—Rare in the sandstone of Boocaun, Cong, County Galway.

Nucula grandæva. *Gold.*

Ref.—Pet. Germ. Pl. 124, fig. 3.

Locality.—Not uncommon in the grey, calcareous sandstone of Boocaun, Cong, County Galway; in the quartzite of Tonlegee, Cong, County Galway.

NUCULA PROTEI. *Münst.*

Ref.—Beïtr. heft. 3. Pl. 11, fig. 9.

Locality.—Rare in the schists of Tirnaskea, Pomeroy, County Tyrone.

NUCULA RADIATA. *Portk.*

Ref.—Geol. Rep. Pl. 36, fig. 11.

Locality.—Common in the sandy slates of Bardahessiagh, Pomeroy, County Tyrone.

NUCULA SUBACUTA. *M'Coy.* (Pl. II. fig. 3).

Sp. Ch.—Transversely trigonal, compressed; length two-thirds the width; beaks about one-third the width from the anterior end; anterior margin straight, oblique, forming an obtusely rounded angle below; ventral margin slightly convex; posterior margin straight, oblique; posterior extremity pointed; surface marked with regular, imbricating, transverse striæ.

This species is figured by Captain Portlock from the same district; but he referred it to the carboniferous species *N. acuta*, Sow., from which it is distinguished by being less convex, much less wide, in proportion to the length, and consequently having a less acute posterior end; the beaks are also more nearly central than in the carboniferous shell. Length two lines, width three lines.

Locality.—Rare in the slates of Tirnaskea, Pomeroy, County Tyrone.

NUCULA SUBCYLINDRICA. *M'Coy.* (Pl. II. fig. 4).

Sp. Ch.—Transversly elliptical, diagonally gibbous, rather more than twice as wide as long; beaks obtuse, small, close to the anterior end, having a slightly oblique laminar impression in front of it; anterior side small, rounded; posterior end obliquely subtruncate, obtusely rounded, a shallow sinus in the front margin; teeth extremely numerous and minute.

This species belongs to that ancient section of the genus having a distinct subrostral plate, probably forming the edge of the muscular impression of the anterior adductor; it most resembles the *N. cylindrica*, Port., of the Pomeroy slates, and the *N. prisca*, Gold., of the Eifel, but differs from both in the concave or sinous front margin, and the broad, obtusely rounded posterior end. The teeth are unusually minute and numerous. Length three lines, width seven and a half lines.

Locality.—Common in the sandstone of Tonlegee, Cong, County Galway.

PECTUNCULUS APJOHNI. *Portk.*

Ref.—Geol. Rep. Pl. 34, fig. 8.

Locality.—Not uncommon in the slates of Tirnaskea, Pomeroy, County Tyrone.

ARCA CYLINDRICA. *Portk.*

Ref.—Geol. Rep. Pl. 34, fig. 9.

Locality.—Common in the schists of Tirnaskea, Pomeroy, County Tyrone; not uncommon in the dark schists of Tullyconnor, Leenane, County Galway.

ARCA DISSIMILIS. *Portk.*

Ref.—Geol. Rep. Pl. 34, fig. 5.

Locality.—Very common in the schists at Tirnaskea, Pomeroy, County Tyrone.

ARCA OBLIQUA. *Portk.*

Ref.—Geol. Rep. Pl. 34, fig. 6.

Locality.—Abundant in the coarse schists of Tirnaskea, Pomeroy, County Tyrone.

ARCA QUADRATA. *M'Coy.* (Pl. II. fig. 5).

Sp. Ch.—Quadrangular, the angles obtusely rounded; width slightly exceeding the length; compressed, convex towards the beak; beaks nearer to the anterior than to the posterior side; hinge line, ventral margin, and sides of nearly equal length, nearly straight, equally convex; surface smooth, or faintly marked with lines of growth; hinge teeth, eight large, before the beak, about twenty-five much smaller behind the beak.

This seems to differ from the *Pectunculus Apjohni*, Portk., by its square form, the much smaller size and greater number of the teeth behind the beak, less central beaks, and more compressed valves, and the very slight convexity of the front margin and sides. Length five and a half lines, width six and a half lines.

Locality.—Rare in the schists of Tirnaskea, Pomeroy, County Tyrone.

ARCA SCITULA. *M'Coy.* (Pl. II. fig. 6).

Sp. Ch.—Transversely ovate; rather more than twice as wide as long; slightly convex; beaks nearly central; anterior side broadly rounded; posterior end pointed, very obliquely truncated; diagonal ridge from the beak to the anal angle, distinct; posterior slope abrupt; surface finely and regularly striated concentrically. Length three lines, width six and a-half lines.

Locality.—Rare in the slates of Lisbellaw, County Fermanagh.

ARCA SUBTRUNCATA. *Portk.*

Ref.—Geol. Rep. Pl. 34, fig. 1.

Locality.—Common in the slates of Tirnaskea, Pomeroy, County Tyrone.

ARCA TRANSVERSA. *Portk.*

Ref.—Geol. Rep. Pl. 34, fig. 4.

Locality.—Common in the slates of Tirnaskea, Pomeroy, County Tyrone.

CUCULLÆA ANTIQUA. *Sow.*

Ref.—Sil. Syst. Pl. 3, fig. 1, *b*.

Locality.—Rare in the slates of Glencraff, Leenane, County Galway.

CUCULLÆA OVATA. *Sow.*

Ref.—Sil. Syst. Pl. 3, fig. 12, *b*.

Locality.—In the grey quartzite of Lettershanbally, Maume, County Galway.

INOCERAMUS CONTORTUS. *Portk.*

Ref.—Geol. Rep. Pl. 33, fig. 5.

Locality.—Rather rare in the slates of Tirnaskea, Pomeroy, County Tyrone.

INOCERAMUS TRIGONUS. *Münst.*

Ref.—Beïtr. h. 3. Pl. 10, fig. 3.

Locality.—Very rare in the slates of Egool, Ballaghaderreen, County Mayo; common in the schists of Lisbellaw, County Fermanagh.

POSIDONIA VENUSTA. *Münst.*

Ref.—Beïtr. heft. 3. Pl. 10, fig. 12.

Locality.—Not uncommon in the black Graptolite slate of Limehill, Pomeroy, County Tyrone.

PTERINEA ELONGATA. *Gold.*

Ref.—Pet. Germ. Pl. 119, fig. 5.

Locality.—Not uncommon in the soft, greenish slates of Ferriter's Cove, Dingle, County Kerry.

PTERINEA FIMBRIATA. *M'Coy.* (Pl. II. fig. 7).

Sp. Ch.—Obliquely ovate, convex; hinge line two-thirds the width of the shell; posterior wing pointed, little more than half the length of the posterior slope; anterior side very small; ventral margin convex; anal angle obtusely pointed; surface radiated with numerous narrow, elevated ridges, alternately larger and smaller, crossed by less numerous, concentric, elevated, undulating scales, about one line apart, the arches of which have the convexity towards the beak, and spring from about every alternate radiating ridge near the margin but include a greater number towards the beak; posterior wing marked with strong, scale-like striæ, parallel with the posterior concave margin.

This beautiful shell is distinguished from the common *P. lineata*, by the rather distant, regular, transverse fimbriation, which is as strongly marked as the longitudinal striation: there are no radiating ridges on the ears, as in the *A. reticulata* of Hisinger and Sowerby, and *P. lamellosa*, Gold., which also differs in having the longitudinal radiation equal, not alternating. Length from the beak to anal angle one inch four lines.

Locality.—Rare in the soft, green slates of Doonquin, Dingle, and Ferriter's Cove, Dingle, County Kerry.

PTERINEA LAMELLOSA. *Gold.*

Ref.—Pet. Germ. Pl. 120, fig. 12.

Locality.—Rare in the slates of Ferriter's Cove, Dingle, County Kerry.

PTERINEA LINEATA. *Gold.*

Ref.—Pet. Germ. Pl. 119, fig. 6.

Locality.—Rare in the slates of Ferriter's Cove, Dingle, County Kerry.

PTERINEA ORBICULARIS. *M'Coy.* (Pl. II. fig. 8).

Sp. Ch.—Sub-orbicular, oblique, flattened; nearly equivalve; left valve slightly convex, right valve flat; length three-fourths the width; hinge-line less than the width of the shell; anterior ear small, pointed; poste-

rior ear shorter than the posterior side of the shell, obtusely pointed; sinus separating it from the body of the shell, shallow, rounded; surface with imbricating concentric lines of growth, crossed in the centre of the shell, near the beak, by rough, flexuous, longitudinal striæ, not reaching half way to the margin.

This species, which grows to a large size, is most allied to the *P. plana*, Gold., from which it is easily distinguished by the very small posterior wing. The radiating striæ seem confined to the left valve. Length two and a half inches, width three inches four lines; posterior wing one inch nine lines; anterior wing six lines.

Locality.—Common in the slate of Doonquin, Dingle, County Kerry; very common in the slate of Ferriter's Cove, Dingle, County Kerry.

PTERINEA(?) PANOPŒAFORMIS. *M'Coy.* (Pl. II. fig. 9).

Sp. Ch.—Transversely oblong, slightly convex; length rather more than half the width; anterior and posterior ends of nearly equal width, subtruncate, rounded; hinge line shorter than the width of the shell; beaks about one-third of the width from the anterior end; teeth as in *Pterinea*; surface with concentric lines and furrows.

This very singular shell resembles a *Lutraria* or *Panopœa* in form, but seems to have the teeth of *Pterinea*. It is much depressed, and with both ends obtusely rounded; hinge-line shorter than the width of the shell, and not forming wings; the surface is obscure, but seems to have obtusely rounded, concentric furrows near the beak, and sharp, imbricating lines of growth near the edge. Length one inch one line; width about two inches. The *Mya rotundata* has the beaks closer to the anterior side, which is also much smaller than the posterior, and the margin is sinuous.

Locality.—Not uncommon in the soft, green shale of Doonquin, Dingle, County Kerry, but badly preserved.

PTERINEA(?) POSIDONIAFORMIS. *M'Coy.* (Pl. II. fig. 10).

Sp. Ch.—Obliquely elongate, flat; length nearly twice the width, of equal width throughout; hinge-line straight, equal to the width of the shell; beaks central; anterior margin convex, posterior concave; front rounded; surface nearly smooth, with numerous, obsolete, concentric wrinkles.

This curious shell resembles the *Posidonia membranacea*, M'Coy, of the Calp, in form; but it is rather stronger and more shell-like than any species of *Posidonia*, and from some traces which I have observed of the teeth, I think, may for the present be included in *Pterinea*. Length one inch three lines; width seven lines.

Locality.—Two specimens have occurred in the greenish slates at Ferriter's Cove, Dingle, County Kerry.

PTERINEA SQUAMOSA. *M'Coy.* (Pl. II. fig. 11).

Avicula retroflexa. *His.* not *Sow.*

Sp. Ch.—Obliquely ovate, convex; hinge line exceeding the width of the shell; beaks tumid, nearest the anterior side; anterior side short, obtusely pointed, a shallow marginal sinus between it and the body of the shell; posterior side forming a broad, flattened, pointed wing; surface girt with fine, regular, equidistant, scale-like lines of growth, parallel with the outer margin.

I have little doubt that this is the shell intended by Hisinger for his *Avicula retroflexa*, but it is certainly distinct from the shell so called by Mr. Sowerby in the Silurian Researches, which latter is by far the most common and well-known species; in changing the genus, therefore, of Hisinger's shell, I have thought it best to give it a name indicative of the regular, scale-like marking of the surface, and leave the term *retroflexa* with the shell best known by it. Length from the beak to the margin ten lines; to the anal angle one inch nine lines.

Locality.—Rare in the greenish slates of Ferriter's Cove, Dingle, County Kerry; in the sandstone of Boocaun, Cong, County Galway.

PTERINEA SUBLÆVIS. *M'Coy.* (Pl. II. fig. 12).

Sp. Ch.—Obliquely ovate; beaks small, prominent; anterior end very small, rounded, distinguished from the body of the shell by a sinus in the margin; posterior side broad, rounded; cardinal angle rectangular; left valve tumid, right valve nearly flat; surface nearly smooth; a few fine, concentric lines of growth, and the middle of the shell marked with broad, obsolete, radiating ridges; cardinal teeth crenated, one in the left valve long, curving from the beak downwards, towards the front margin, so that its extremity is half its own length distant from the hinge-line; two long teeth similarly curved in the flat valve, the upper one shortest.

This species is intermediate in much of its character between the *P. lævis* and the *P. plana*, Gold.; it is, however, much less ventricose, and less oblique than the first species, from which it also differs entirely in its hinge teeth, agreeing in those points more nearly with the *P. plana*, from which it is easily distinguished by its more oblique form, and wanting the posterior wing of that shell. Length (of a small perfect specimen) five lines; of hinge-line seven lines; of posterior side, from the beak to the cardinal angle, five lines. Other specimens are one inch three lines long.

Locality.—Common in the sandstone of Boocaun, Cong, County Galway.

AVICULA BULLATA. *M'Coy.* (Pl. II. fig. 13).

Sp. Ch.—Obliquely ovate, gibbous, smooth; beaks large, tumid; anterior side contracted, forming a small, rounded lobe; posterior side flattened, extended into a narrow, acute wing; ventral margin very convex; anal angle rounded.

This shell does not resemble any other *Silurian* species that I know, although resembling several in the newer rocks. Length, at right angles with the hinge-line, from the beak to the ventral margin, four and a half lines; length, from the beak to the anal angle, eight lines; length of hinge-line about eight lines.

Locality.—Common in the grey sandstone (weathering brown) at Lettershanbally, Maume, County Galway.

AVICULA LINEATA. *Sow.*

Ref.—Sil. Syst. Pl. 5, fig. 10.

Locality.—Rare in the grey sandstone of Boocaun, Cong, County Galway; common in the slates of Doonquin, Dingle, County Kerry; abundant in the yellowish green slates of Ferriter's Cove, Dingle, County Kerry.

AVICULA RETICULATA. *Sow.* not *His.*

Ref.—Sil. Syst. Pl. 6, fig. 3.

Locality.—Not uncommon in the slates of Doonquin, Dingle, County Kerry.

AVICULA RETROFLEXA. *Sow.* not *His.*

Ref.—Sil. Syst. Pl. 5, fig. 9.

Locality.—Rare in the sandstone of Boocaun, Cong, County Galway; common in the slates of Doonquin, Dingle, County Kerry.

AVICULA RUDIS *Phil.* (?)VAR.

Ref.—Pal. Foss. Pl. 22, fig. 85.

Locality.—Boocaun, Cong, County Galway.

Monotis semiauriculata(?). *Münst.*

Ref.—Breïtr. heft. 3. Pl. 11, fig. 1.

Locality.—Rare in the slates of Doonquin, Dingle, County Kerry.

Lingula attenuata. *Sow.*

Ref.—Sil. Syst. Pl. 22, fig. 13.

Locality.—Rare in the slates of Kilbride, Cong, County Galway.

Lingula cornea. *Sow.*

Ref.—Sil. Syst. Pl. 3, fig. 3.

Locality.—Rare in the slates of Doonquin, Dingle, County Kerry.

Lingula lewisii. var. *Sow.*

Ref.—Sil. Syst. Pl. 6, fig. 9.

Locality.—Rare in the grey quartzites of Shanballymore, Outerard, County Galway; rare in the slates of Ardaun, Cong, County Galway.

Lingula ovata. *M'Coy.* (Pl. III. fig. 1).

Sp. Ch.—Ovate, elongate, apex gradually pointed, semi-elliptical; sides nearly parallel, very slightly convex; front obtusely rounded, less than twice the width, depressed; shell very thin, nearly smooth, having very fine lines of growth parallel to the margin, and faint, radiating striæ on the cast towards the front margin.

This fine species, so remarkable for its size, approximates in some points to the *L. Lewisii*, but is distinguished by its greater length in proportion to the width, in which it approaches to the *L. attenuata*, which is also of the same geological age, but it is much larger, and not suddenly attenuated retrally; the form, in fact, is almost precisely that of the *Lingula squamiformis* (well figured by Captain Portlock) so common in the carboniferous shales of Leam Tempo, the only difference being the great size of the Silurian species, and the front being more rounded; the substance of the present shell is also thinner. Length one inch three lines; width nine lines.

Locality.—Of very large size, in the shale of Ballygarvan Bridge, New Ross, County Wexford; common in the shale of Chair of Kildare, County Kildare; common in the shale of Newtown Head, County Waterford.

Orbicula oblongata. *Portk.*

Ref.—Geol. Rep. Pl. 32, fig. 13.

Locality.—Not uncommon in the sandy schists of Bardahessiagh, Pomeroy, County Tyrone; common in the slates of Tirnaskea, Pomeroy, County Tyrone.

Orbicula perrugata. *M'Coy.* (Pl. III. fig. 2).

Sp. Ch.—Nearly orbicular, depressed; about one-sixth wider than long; apex one-third the diameter from the margin; surface strongly wrinkled concentrically.

This species is distinguished from the *O. rugata*, Sow., and *O. plana*, Münst., by the greater distance of the apex from the margin in the present shell; and from the *O. subrugata*, Münst., by the strong, concentric wrinkles; it most resembles the carboniferous *O. nitida*, Phil., but is much more depressed, and strongly wrinkled. Length four and a half lines; width five lines; height one line.

Locality.—Rare in the fine sandstone of Kilbride, Cong, County Galway.

Crania antiquissima(?). *Eichw.*

Locality.—Rare in the shale of Chair of Kildare, Kildare, County Kildare.

Producta monilifer. *M'Coy.* (Pl. III. fig. 3).

Sp. Ch.—Sub-orbicular, very gibbous, no mesial furrow; hinge-line slightly shorter than the width of the shell; surface with about six strong, continuous, concentric ridges, having a slight retral wave in the front, closely set with tubercular spine bases; ventral valve nearly as concave as the dorsal is convex, and similarly marked.

This beautiful little species is the miniature of the *P. pustulosa*, Phil., of the carboniferous series, having, like it, distinct, continuous, transverse wrinkles, on which the tubercles are placed in close order. Length two lines; width three lines.

Locality.—Common in the limestone of Chair of Kildare, Kildare, County Kildare.

Producta tenuicincta. *M'Coy.* (Pl. III. fig. 4).

Sp. Ch.—Semi-cylindrical, short; beaks small; mesial furrow slight; front short, rounded; sides compressed; hinge-line equal to the width of the shell; entire surface marked with very fine, close, slightly undulating, imbricated striæ; a few irregularly scattered, lengthened spine bases; ventral valve concave.

This little *Producta* has much the surface of *Anomia*; it is marked in the most beautiful manner with fine, undulating, transverse striæ, somewhat resembling the *P. membranacea*, Phil., but infinitely more delicate and regular; the few scattered spines resemble those of the *P. laxispina*, Phil. Length of dorsal valve six lines; width five lines.

Locality.—Common in the limestone of Chair of Kildare, Kildare, County Kildare.

Leptagonia(*a*) depressa. *Dal.* sp.

Ref.—Leptæna depressa. Act. Holm. 1827. Pl. 1, fig. 2.

Locality.—Common in the sandstone of Ardaun, Cong, County Galway; Chair of Kildare, Kildare, County Kildare; in the slates of Doonquin, Dingle, County Kerry; in the slates of Egool, Ballaghaderreen, County Mayo; common in the greenish slates of Ferriter's Cove, Dingle, County Kerry; in the grey and purple slates of Foylathurrig, Dingle, County Kerry; in the grey calcareous slates of Kilbride, Cong, County Galway; in the grey, calcareous sandstone of Munterowen, Leenane, County Galway; in the dark grey limestone and slates of Portrane, Malahide, County Dublin; in the sandstone of Tonlegee, Cong, County Galway; in the slates of Tieravane, Dingle, County Kerry; in the blackish schists of Tullyconnor, Leenane, County Galway.

Leptagonia plicotis. *M'Coy.* (Pl. III. fig. 5).

Sp. Ch.—Flattened rostral portion varying from obtusely trigonal to semicircular, depressed, or very slightly convex; marginal angle obtuse; deflected front short; hinge-line slightly exceeding the width of the shell; car-

(*a*) For the genus *Leptagonia*, M'Coy, see Synopsis of the Carboniferous Limestone Fossils of Ireland, p. 116.

dinal angles short, obtusely pointed; surface covered with fine, hair-like, radiating striæ, slightly flexuous and irregular in thickness, increasing in number towards the margin; the sides and ears marked with numerous, very irregular wrinkles, or plicæ, only a few of which pass, in an irregular and interrupted manner, across the middle.

This interesting little species is most allied to the *L. tenuistriata*, Sow., but differs entirely in wanting the regular, transverse ridges of that species, and in the very irregular, oblique plication of the ears; the hinge, ears, and foramen, are broad and distinct, as in the other species of this genus. Length of flat rostral portion six lines; length of deflected front three lines; length of hinge-line eleven lines.

Locality.—Very abundant in the shale of Chair of Kildare, Kildare, County Kildare.

Leptagonia semiovalis. *M'Coy.* (Pl. III. fig. 6).

Sp. Ch.—Upper surface truncato-oval or subtrigonal; the length two-thirds the width, flat or slightly concave; deflected margin, about half the length of the upper surface; front narrow, obtusely rounded; rostral or flat portion with about ten, more or less regular, concentric wrinkles; entire surface marked with fine, longitudinal striæ, an irregular number of which (about every fourth or fifth on the front) are twice the thickness of the rest, forming thin, irregular ridges between the striæ, as in the *L. euglypha*.

This remarkable species has the subtriangular contour of the *L. euglypha*, the sides inclining towards each other, and merging into a narrow, rounded front; it has also the delicate, longitudinal striæ, and thin, irregularly distributed, longitudinal ridges of that species, but fewer of the latter; added to those, however, it has the concentric wrinkles, on the flat portion, of *L. analoga* or *L. depressa*, from which it differs in the striation, narrow, rounded front, and the greater length, in proportion to the width, of the flat portion. Length of rostral portion ten lines; width one inch two lines; depth of deflected margin five lines.

Locality.—Very common in the limestone of Chair of Kildare, Kildare, County Kildare.

Leptagonia tenuistriata. *Sow.* sp.

Ref.—*Leptæna tenuistriata.* Sil. Syst. Pl. 22, fig. 2.

Locality.—Common in the arenaceous schists of Killey, Pomeroy, County Tyrone; in the grey calcareous slates of Kilbride, Cong, County Galway; in the schists of Tirnaskea, Pomeroy, County Tyrone; in the slates of Tieravane, Dingle, County Kerry.

Leptæna complanata. *Sow.* var.

Ref.—Sil. Syst. Pl. 20, fig. 6.

Locality.—Common at Grangegeeth, County Meath; rare at Kildermot, Gorey, County Wexford; in the schists of Knockmahon, Tramore, County Waterford.

Leptæna duplicata. *Sow.*

Ref.—Sil. Syst. Pl. 22, fig. 2.

Locality.—The internal casts not uncommon in the sandy schists of Killey, Pomeroy, County Tyrone; but it is, probably, not a distinct species.

LEPTÆNA LATA(*a*). V. *Buch.*

Ref.—Sil. Syst. Pl. 5, fig. 13.

Locality.—Common in the slates of Doonquin, Dingle, County Kerry; common in the green slates of Ferriter's Cove, Dingle, County Kerry.

LEPTÆNA LÆVISSIMA. *M'Coy.* (Pl. III. fig. 7).

Sp. Ch.—Nearly semicircular, gibbous; length rather more than half the width; ears nearly rectangular; surface perfectly smooth.

This shell has the form and proportions, on a smaller scale, of the *O. Hardrensis*, Phil., but is distinguished from it and all the allied species, by its perfectly smooth surface. It is distinguished from the nearly smooth *L. oblonga*, Pand., sp., by its much greater width in proportion to the length. Length two lines; width three lines.

Locality.—Occurs in extraordinary abundance, filling a thin, reddish bed of slate at Doonquin and Ferriter's Cove, Dingle, County Kerry.

LEPTÆNA PLICATA(?). *Sow.*

Ref.—Trans. Geol. Soc. 2nd Series. Vol. 6, pl. 38, fig. 16.

The fossils which I have referred to this species in Ireland differ from the *O. flabellulum*, Sow., in the much branched ribs, resembling those of the *O. Actoniæ*, but more numerous; and from the *O. flabellulum* and all the varieties of the *O. calligramma* and other allied forms, by having a flat or slightly *concave* ventral valve.

Locality.—Very common in the slates of Greenville, Enniscorthy, County Wexford; in the slates of Slieve Roe, Rathdrum, County Wicklow.

LEPTÆNA SEMIRADIATA. *Sow.*

Ref.—Geol. Trans. Vol. 6, Pl. 38, fig. 14.

Locality.—Abundant in the slates of Doonquin, Dingle, County Kerry.

LEPTÆNA SERICEA. *Sow.*

Ref.—Sil. Syst. Pl. 19, fig. 1.

Locality.—Common in the slates of Ballygarvan Bridge, County Wexford; abundant in the arenaceous beds of Bardahessiagh, Pomeroy, County Tyrone; very common in the shale of Chair of Kildare, Kildare, County Kildare; in the slates and grits of Carrickadaggan, New Ross, County Wexford; in the calcareous slates of Glencraff, Leenane, County Galway; very common in the slates of Greenville, Enniscorthy, County Wexford; common in the schists of Knockmahon, Tramore, County Waterford; common in the sandstone of Killey, Pomeroy, County Tyrone; Leecarrow, Cong, County Galway; abundant in the blackish limestone of Portrane, Malahide, County Dublin; very common in the slates of Tirnaskea, Pomeroy, County Tyrone; common in the slates of Tieravane, Dingle, County Kerry.

(*a*) The *L. sarcinulata*, as at present recognised, is manifestly a species including the Carboniferous and Devonian *L. Hardrensis* with the true Silurian *L. lata*. It seems desirable, therefore, to retain the two latter names for the species of their respective formations.

LEPTÆNA TRANSVERSALIS. *Dal.*

Ref.—Act. Hol. for 1827. Pl. 1, fig. 4.

Locality.—Rare in the slates of Ardaun, Cong, County Galway.

ORTHIS ACTONIÆ. *Sow.*

Ref.—Sil. Syst. Pl. 20, fig. 16.

Locality.—Ballygarvan Bridge, New Ross, County Wexford; Chair of Kildare, Kildare, County Kildare; common at Carrickadaggan, New Ross, County Wexford; in the slates of Greenville, Enniscorthy, County Wexford; in the sandstone of Killey, Pomeroy, County Tyrone; in the dark limestone of Portrane, Malahide, County Dublin; in the slates of Rathdrum Bridge, County Wicklow; in the slates of Slieve Roe, Rathdrum, County Wicklow.

ORTHIS ASMUSI. *De Ver.*

Ref.—Geol. Russ. Pl. 10, fig. 17. (*O. Pecten*, Sow.(?). Not of Dalman).

Locality.—Common in the sandy schists of Bardahessiagh, Pomeroy, County Tyrone; common in the soft, green slates of Ferriter's Cove, Dingle, County Kerry; common in the fine sandstone of Killey, Pomeroy, County Tyrone; not uncommon in the schists of Tirnaskea, Pomeroy, County Tyrone.

ORTHIS ALTERNATA. *Sow.*

Ref.—Sil. Syst. Pl. 19, fig. 6.

Locality.—In the calcareous slates of Ardaun, Cong, County Galway; common at Grangegeeth, County Meath; common in the dark limestone of Portrane, Malahide, County Dublin; in the schists of Knockmahon, Tramore, County Waterford.

ORTHIS CALCARATA. *M'Coy.* (Pl. III. fig. 9).

Sp. Ch.—Semicircular, rather more than twice as wide as long, convex; sides, extended to flattened, smooth, acute spines; surface radiated with twelve large, angular, entire ribs, separated by broad, concave spaces, finely striated concentrically; beaks prominent.

This species is closely allied to the *S. alatus*, Sow., of the Llandeilo flags, but is distinguished by its much fewer ribs, which do not exceed twelve in the present species, but are about eighteen in the former. The form is nearly that of the *S. calcarata*, Sow., of the carboniferous slate, with smooth, flattened, acute, cardinal angles. The *Delthyris sculptilis*, Hall., is distinguished by its strongly sculptured surface.

Locality.—Rare in the slates of Greenville, Enniscorthy, County Wexford; very common in the slates of Slieve Roe, Rathdrum, County Wicklow.

ORTHIS CALLACTIS(?). VAR. *Sow.*

Ref.—Sil. Syst. Pl. 19, fig. 5.

Locality.—Rare in the limestone of Chair of Kildare, Kildare, County Kildare; in the sandstone of Killey, Pomeroy, County Tyrone.

ORTHIS CANALIS. *Sow.* (*See* O. ELEGANTULA.)

Orthis concentrica. *Portk.*

Ref.—Geol. Rep. Pl. 37, fig. 1.

Locality.—Common at Grangegeeth, County Meath; not uncommon in the schists of Knockmahon, Tramore, County Waterford; abundant in the coarse slates at Tirnaskea, Pomeroy, County Tyrone.

Orthis corrugata. *Portk.*

Ref.—Geol. Rep. Pl. 32, figs. 17, 18.

Locality.—Common in the sandstone of Killey, Pomeroy, County Tyrone; abundant in the slates of Tirnaskea, Pomeroy, County Tyrone.

Orthis compressa. *Sow.*

Ref.—Sil. Syst. Pl. 22, fig. 12.

Locality.—Rare in the coarse schists of Bardahessiagh, Pomeroy, County Tyrone; in the slate at Cappacorcogue, Cong, County Galway; rare in the green slates of Doonquin, Dingle, County Kerry; rare in the slates of Greenville, Enniscorthy, County Wexford; rare in the sandstone of Tonlegee, Cong, County Galway.

Orthis costata. *Sow.*

Ref.—Sil. Syst. Pl. 21, fig. 11.

Locality.—Rare in the sandstone of Killey, Pomeroy, County Tyrone.

Orthis crispa. *M'Coy.* (Pl. III. fig. 10).

Sp. Ch.—Nearly semicircular, length exceeding half the width; dorsal valve convex, with a slight mesial hollow; ventral valve flatter; surface radiated with about forty sharp, close, rounded, much-branched ridges; which, together with the narrow, intervening spaces, are crossed by close, erect, scale-like, waving lines of growth.

The surface of this beautiful shell bears some resemblance to the *Atrypa prisca*, and *A. orbicularis*, but it has a long hinge, and the distinct cardinal area of *Orthis:* it is, moreover, distinguished by the greater number of its narrow, much branched ribs, and the close, sharp, transverse sculpturing of the entire surface.

Locality.—Rare in the coarse slates of Bardahessiagh, Pomeroy, County Tyrone; very common in the schists of Knockmahon, Tramore, County Waterford; rare in the slates at Tirnaskea, Pomeroy, County Tyrone.

Orthis elegantula. *Dal.*

Ref.—*O. canalis.* Sil. Syst. Pl. 20, fig. 8.

Locality.—Common in the grey calcareous sandstone of Ardaun, Cong, County Galway; in the compact calcareous quartzites of Blackwater Bridge, Leenane, County Galway; very common in the shale of Chair of Kildare, Kildare, County Kildare; abundant in the slates of Doonquin, Dingle, County Kerry; in the dark, greenish slate of Egool, Ballaghaderreen, County Mayo; in the hard, calcareous slates of Glencraff, Leenane, County Galway; in the slates of Greenville, Enniscorthy, County Wexford; in the schists at Kildermot, Gorey, County Wexford; in the schists of Knockmahon, Tramore, County Waterford; common in the slates

north of Newtown Head, County Waterford; common in the slates of Slieve Roe, Rathdrum, County Wicklow; in the grey, indurated sandstone of Tonlegee, Cong, County Galway; common in the dark slates of Tullyconnor, Leenane, County Galway; abundant in the slates of Tieravane, Dingle, County Kerry.

Orthis euglypha. *Dal.* sp.

Ref.—*Leptæna euglypha.* Sil. Syst. Pl. 12, fig. 1.

Locality.—In the limestone of Chair of Kildare, Kildare, County Kildare; very common in the slates of Doonquin, Dingle, County Kerry; abundant in the green slates of Ferriter's Cove, Dingle, County Kerry.

Orthis filosa. *Sow.*

Ref.—Sil. Syst. Pl. 13, fig. 12.

Locality.—Rare in the soft, green slates of Doonquin, Dingle, County Kerry; rare in the green slates of Ferriter's Cove, Dingle, County Kerry.

Orthis flabellulum. *Sow.*

Ref.—Sil. Syst. Pl. 21, fig. 8.

I have preferred retaining Mr. Sowerby's name for this well-known form, rather than rank it among the varieties of the *O. calligramma*, for the present.

Locality.—Very abundant in the grey, calcareous slates of Kilbride, Cong, County Galway; and in the schists and sandstone of Shanballymore, Cong, County Galway.

Orthis funiculata. *M'Coy.* (Pl. III. fig. 11).

Sp. Ch.—Semicircular; twice as wide as long; slightly convex towards the beak; margin forming a narrow, deflected border, the angle obtusely rounded; hinge-line slightly exceeding the width of the shell; ears acute, cardinal area narrow; surface radiated with coarse, cord-like, obtuse striæ, frequently branched, but not altering much in thickness; about four in the space of one line on the margin.

This species most resembles the *Leptæna complanata*, Sow., and *L. deltoidea*, Conrad., but is wider in proportion to the length, and more broadly rounded in front than the *L. complanata*, and is easily distinguished from those and the allied species by the thick, obtuse, nearly equal striæ. Length to margin five lines; width ten lines; depth of deflected front one line.

Locality.—Common at Ballyaglish, County Kerry; very common in the slates of Doonquin, Dingle, County Kerry.

Orthis galea. *M'Coy.* (Pl. III. fig. 12).

Spirifer insularis. *Pand.* var.(?).

Sp. Ch.—Sub-orbicular, very gibbous; depth two-thirds the length; width slightly exceeding the length; ventral valve very gibbous, arched from the large, tumid beak to the front, which is raised to form a very deep, square, mesial sinus, from which, in old individuals, an obscure, square, mesial ridge extends towards the beak; sides forming a deep, rounded lobe on each side; dorsal valve nearly flat, having towards the margin a broad depression, corresponding to the sinus in the ventral margin; beak of the ventral valve small, sharp; cardinal area narrow, triangular; surface smooth.

This shell closely resembles the *O. alta*, M'Coy, of the carb. limestone, but has the surface smooth; it

also resembles the Silurian *A. undata* and *A. linguifera*, Sow., but has the cardinal area of *Orthis*, and the mesial elevation in the large instead of the small valve: it is still nearer to the *Spirifer porambonites*, v. Buch., and the *S. rotundus*, Pand., but is distinguished by the wider area, very small size of the beak of the ventral valve, and smooth surface; and from the *S. insularis*, Pand., in the shortness of the cardinal area. Length of young specimens seven lines; width seven and a half lines; depth five lines.

Locality.—Very common in the grey, subcrystalline limestone of Chair of Kildare, Kildare, County Kildare; and in the dark limestone and slates of Portrane, Malahide, County Dublin.

ORTHIS GRANDIS. *Sow.* VAR.(?).

Ref.—Portk. Geol. Rep. Pl. 32, fig. 25.

Locality.—This variety, which may prove distinct, is abundant in the sandy schists of Bardahessiagh, Pomeroy, County Tyrone; and in the coarse schists of Tirnaskea, Pomeroy, County Tyrone.

ORTHIS HYBRIDA. *Sow.* VAR.

Ref.—Sil. Syst. Pl. 13, fig. 11.

Locality.—Rare in the greenish slates of Ferriter's Cove, Dingle, County Kerry; not uncommon in the slates of Tieravane, Dingle, County Kerry.

ORTHIS IMBREX. *Von Buch.*

Ref.—Pand. Beïtr. Pl. 19, fig. 12.

Locality.—Common at Grangegeeth, County Meath; rare in the slates of Kilbride, Cong, County Galway.

ORTHIS INTERCOSTATA. *Portk.*

Ref.—Geol. Rep. Pl. 37, fig. 3.

Locality.—Not uncommon in the sandy slates of Bardahessiagh, Pomeroy, County Tyrone; common in the sandstone of Killey, Pomeroy, County Tyrone.

ORTHIS INTERPLICATA. *M'Coy.* (Pl.III. fig. 13.)

Sp. Ch.—Nearly semicircular; length rather more than half the width; gibbous in the middle; ears flattened; surface marked with ten large angular costæ, which become obscure towards the beak; between each pair is one of nearly equal thickness at the margin, but only half the length.

This species is somewhat allied to the *L. transversalis*, but is easily distinguished by its large, angular costæ, and the intervening spaces being smooth; the *O. antiquata* is much more depressed, longer, and more irregularly radiated. Length three and a half lines; width five and a half lines.

Locality.—Common in the limestone of Chair of Kildare, Kildare, County Kildare.

ORTHIS LÆVIS. *Sow.* SP.

Ref.—Spirifer lævis. *Sow.* Sil. Syst. Pl. 21, fig. 12.

Locality.—Rare at Kildermot, Gorey, County Wexford.

Orthis lunata. *Sow.*

Ref.—Sil. Syst. Pl. 5, fig. 15.

Locality.—Not uncommon in the sandy slates of Ballyaglish, County Kerry; common in the slates of Ferriter's Cove, Dingle, County Kerry.

Orthis orbicularis. *Sow.*

Ref.—Sil. Syst. Pl. 5, fig. 16.

Locality.—Common in the calcareous sandstone of Blackwater Bridge, County Galway; common in the slates of Doonquin, Dingle, County Kerry; abundant in the greenish slates of Ferriter's Cove, Dingle, County Kerry; common in the grey calcareous slate of Kilbride, Cong, County Galway; common in the grey sandstone of Lettershanbally, Maume, County Galway; common in the sandstone of Munterowen, Leenane, County Galway.

Orthis parva. *Pand.*

Ref.—Beïtr. Pl. 26, figs. 10, 11.—Vern. Geol. Rus. Pl. 13, fig. 3.

Locality.—Common in the sandstone of Killey, Pomeroy, County Tyrone; abundant in the schists of Tirnaskea, Pomeroy, County Tyrone.

Orthis pecten. *Sow.* (*See* O. asmusi).

Orthis porcata. *M'Coy.* (Pl. III. fig. 14.)

Sp. Ch.—Truncato-orbicular; one valve nearly flat, the other slightly convex; no mesial elevation or furrow; surface of both valves radiated with very coarse, angular ridges, of unequal length; from fifty to sixty round the margin of a specimen three-fourths of an inch long.

In this remarkable species, one of the ridges will frequently branch into three or four at once, as in the *O. Actoniæ;* but alternating with those are some quite simple from the beak to the margin, others dividing into two, &c., and the entire system of branching is much more irregular, both in distance from the beak and number of the branches, than in that species, and the ridges are much more numerous; they are also more numerous, and more distinctly and frequently branched than in the *O. rustica*, which, with the flat valve of the *O. Verneuili*, are the only other species particularly resembling it; the latter species is distinct, by its conical dorsal valve, and very high triangular area. In some of the specimens the ridges seem more rounded, and crossed by sharp lines of growth. Length of small specimens, about seven lines; width eight lines (frequently an inch long); height of cardinal area one line.

Locality.—Common in the dark limestone of Portrane, Malahide, County Dublin.

Orthis(?) productoides. *M'Coy.* (Pl. III. fig. 15.)

Sp. Ch.—Semi-cylindrical, short; ventral valve wider than long, flattened, evenly convex; dorsal valve very gibbous; bilobed by a deep, rounded, mesial furrow; beak very large, tumid; front deflected, flattened; surface with fine, obtuse, much-branched striæ, of irregular thickness; about eight in the space of one line.

This is one of the very few species of *Orthis* which, like the *O. bilobata*, Sow., and *O. Kellii*, M'Coy,

have a longitudinal depression in the middle of the dorsal valve, as in *Producta*, this part being particularly *convex* in the more typical *Orthidæ*. The species before us bears some resemblance to small individuals of *Producta lobata* in form, the striation most nearly resembles that of the *Orthis orbicularis*, Sow., but is finer, and rather more irregular in thickness. Length of dorsal valve three lines; width four lines.

Locality.—Common in the schists of Knockmahon, Tramore, County Waterford.

Orthis protensa. *Sow.*(?). var.

Ref.—Sil. Syst. Pl. 22, figs. 8, 9.

Locality.—In the slates at Duffcarrick, Gorey, County Wexford; in the slates of Greenville, Enniscorthy, County Wexford; in the slates of Slieve Roe, Rathdrum, County Wicklow.

Orthis pseudopecten. *M'Coy.* (Pl. III. fig. 16).

Sp. Ch.—Transversely oblong, depressed; nearly twice as wide as long; hinge-line as long as the shell is wide; cardinal area triangular, moderate; surface with very fine, numerous striæ, increasing very much in number towards the margin, alternately larger and smaller, with every second of the large ones stronger than the others; cast with very strong, concentric wrinkles towards the margin; muscular impressions faintly striated radiatingly.

The striæ of this species perfectly resembles those of the *O. pecten* of Sowerby (not of Dalman), but it is much wider than that shell, and has a straighter front margin; from *O. grandis*, and *O. expansa*, it differs in the same points of form, in the character of the striation, the concentric wrinkles in the cast, and the slightly striated muscular impressions; from the *O. concentrica.*, Portk., and *O. alternata*, Sow., it differs in its greater width, and in its fine, peculiar striæ. Length one inch; width one inch ten lines.

Locality.—Common at Grangegeeth, County Meath; common in the schists of Knockmahon, Tramore, County Waterford.

Orthis quinquecostata. *M'Coy.* (Pl. III. fig. 8).

Sp. Ch.—Semicircular, twice as wide as long; one valve flat, or slightly convex, the other gibbous in the middle, flattened towards the sides; hinge-line exceeding the width of the shell; cardinal angles acute; surface of both valves, with five slender, equidistant, rounded ridges, sides of the shell, and broad spaces between the ridges; very finely and closely striated longitudinally.

This elegant shell might at first be confounded with the *Leptæna transversalis*, Dal.; but in that species the lesser valve is very concave, while in the present species it is flat or slightly convex; in that shell also, the longitudinal ridges are from fourteen to twenty in number, but in all the specimens examined of the present species, ranging in width from three lines to nearly one inch, they were uniformly five; it is, perhaps, more nearly allied to the *Plectambonites crassa*, and *P. planissima*, Pand. (*Leptæna convexa*, Vern.), which has nearly the same number of ridges; but the present shell differs from it also in the flatness of the ventral valve; and from all those species, in having the intervening spaces longitudinally instead of transversely striated.

Locality.—Not uncommon, of small size, in the sandstone at Coolin, Cong, County Galway; rare, but much larger, in the limestone of Chair of Kildare, Kildare, County Kildare; rare in the slates, &c., of Kilbride, Cong, County Galway.

Orthis radians. *Sow.*

Ref.—Sil. Syst. Pl. 22, fig. 11.

Locality.—Not uncommon in the sandy slates of Bardahessiagh, Pomeroy, County Tyrone; rare in the schists of Knockmahon, Tramore, County Waterford.

Orthis rugifera. *Portk.*

Ref.—Geol. Rep. Pl. 37, fig. 2.

Locality.—Rare at Knockmahon, Tramore, County Waterford; not uncommon at Killey, Pomeroy, County Tyrone.

Orthis rustica. *Sow.*

Ref.—Sil. Syst. Pl. 12, fig. 9.

Locality.—Common in the slates at Doonquin, Dingle, County Kerry; not uncommon in the green slates of Ferriter's Cove, Dingle, County Kerry; common in the slates at Foylathurrig, Dingle, County Kerry.

Orthis sarmentosa. *M'Coy.* (Pl. III. fig. 17).

Sp. Ch.—Transversely oblong; nearly three times wider than long; flat; hinge-line equal to the width of the shell; front margin nearly parallel with the hinge; sides subtruncate, rounded; surface radiated with about sixty rather thick, flexuous, rounded ridges, frequently and irregularly branching between the beak and the margin; finer, closer, and less branched towards the sides; about three in the space of one line in the middle of the margin.

This species has much the form of the *O. lata*, Sow., but the radiating ridges are very much coarser, and more distinctly and frequently branched, resembling small twigs, the lateral ones being frequently simple; the character of the striation being similar to that of the *O. nervosa* of American writers. Length five lines; width fourteen lines; some much larger.

Locality—Common in the slates at Rathdrum Bridge, County Wicklow; very common in the fine slates of Slieve Roe, Rathdrum, County Wicklow.

Orthis semicircularis. *Sow.*

Ref.—Sil. Syst. Pl. 21, fig. 7.

Locality.—Rare in the slates of Foylathurrig, Dingle, County Kerry; rare in the slates at Greenville, Enniscorthy, County Wexford.

Orthis simplex. *M'Coy.* (Pl. III. fig. 18).

Sp. Ch.—Sub-conical; front semicircular; length and width of the dorsal valve nearly equal; hinge-line equal to the width of the shell; cardinal area very large, triangular, half as high as wide; dorsal valve evenly convex, radiated with about twenty-four strong, obtusely angular ridges, of uniform length and thickness, all continuing sharp and distinct to the beak: ventral valve nearly semicircular; length rather more than half

the width; evenly convex, depressed; surface ridged as in the dorsal valve; cardinal area very low, triangular; about four times as wide as high.

This species resembles the *O. testudinaria*, but is distinguished from it and all the allied species by the simplicity and equality of the ridges, all of which reach the beak in both valves; the cardinal area is unusually large, and distinguishes it at once from the *O. virgata* and *O. orthambonites*, to which it approaches most nearly. The internal cast of the ventral valve is smooth in the centre, and marked round the margin with twenty-four narrow, radiating ridges; the internal cast of the pyramidal dorsal valve has the ridges sharp, and continued nearly to the beak. Length of dorsal valve five and a half lines; width six lines; length of ventral valve three and a half lines.

Locality.—Rare in the grits of Carrickadaggan, New Ross, County Wexford; very common in the soft, decomposing schists at Knockmahon, Tramore, County Waterford.

Orthis sublævis. *M'Coy.* (Pl. III. fig. 19).

Sp. Ch.—Front abruptly deflected (as in *Leptagonia*); upper portion even, very slightly convex, semicircular, twice as wide as long; ears small, acute; cardinal area narrow, triangular; deflected front, slightly shorter than the rostral portion; surface smooth to the eye, under the lens marked with extremely fine, equal, longitudinal striæ; two or three small, obsolete, concentric wrinkles on each side.

This very distinct little shell is not likely to be confounded with any others with which I am acquainted, the *L. oblonga*, Pand. sp., being distinguished by its length exceeding the width of the hinge-line. Length two and a half lines; width four and a half lines.

Locality.—Not uncommon in the limestone of Chair of Kildare, Kildare, County Kildare.

Orthis tenuissimestriata. *M'Coy.* (Pl. III. fig. 20).

Sp. Ch.—Semicircular; twice as wide as long; both valves flat; hinge as long as the shell is wide; cardinal angles slightly pointed; cardinal area narrow, with nearly parallel sides; striation of the surface scarcely visible to the naked eye, composed of extremely fine, equal, radiating striæ, slightly branching.

This species has the exact form and general character of the *Spirifer* (*Orthis*) *lævis*, Sow., but the surface is finely striated; the striation is much finer, and the valves flatter than in the *O. lata*, Sow. Length six lines; width one inch (small specimen).

Locality.—Very abundant in the slates of Slieve Roe, Rathdrum, County Wicklow.

Orthis testudinaria. *Dal.*

Ref.—Pl. 2, fig. 4(?). Sil. Syst. Pl. 20, fig. 9.

Locality.—Common in the slates at Ballygarvan Bridge, New Ross, County Wexford; common in the shale of Chair of Kildare, Kildare, County Kildare; in the slates and grits of Carrickadaggan, New Ross, County Wexford; in the dark limestone of Portrane, Malahide, County Dublin; common in the slates of Slieve Roe, Rathdrum, County Wicklow.

Orthis triangularis. *Sow.*

Ref.—Sil. Syst. Pl. 20, fig. 17.

Locality.—Rare in the slates of Greenville, Enniscorthy, County Wexford.

Orthis undata. *M'Coy.* (Pl. III. fig. 21).

Sp. Ch.—Semi-oval; slightly convex; length three-fourths of the width; hinge-line longer than the width of the shell; cardinal angles acute; surface (smooth?) concentrically marked with numerous narrow, short, irregular, ripple-like wrinkles.

This shell is not liable to be confounded with any other species I know of; some partially decorticated specimens exhibit faint and obscure traces of very fine, longitudinal striæ; the best preserved specimens have the surface smooth, exclusive of the transverse wrinkles, and such I believe to be the true character. Length one inch nine lines; width two inches six lines.

Locality.—Not uncommon in the grey calcareous slates of Egool, Ballaghadarreen, County Mayo.

Orthis undulata. *M'Coy.* (Pl. III. fig. 22).

Sp. Ch.—Truncato-orbicular; length rather more than half the width; very slightly convex; hinge-line equal to the width of the shell; cardinal angles slightly pointed; cardinal area narrow, triangular, with a triangular foramen beneath the beaks; surface with about sixteen strong, radiating striæ of unequal length, between which are strong, undulating wrinkles, arranged in irregular concentric series.

This beautiful shell is only in danger of being confounded with the *O. corrugata*, Portk., from which it is known by having little more than half the number of radiating ridges in specimens of the same size, and their greater distance from each other (they are about a line apart in the present species, about half that in the other); the transverse wrinkles between the ridges are also stronger and more flexuous in the present shell. Length six lines, width eight lines, height of cardinal area one line.

Locality.—Very common in the limestone of Chair of Kildare, Kildare, County Kildare; rare in the shale of Egool, Ballaghadarreen, County Mayo.

Orthis vespertilio. var. *Sow.*

Ref.—Sil. Syst. Pl. 20, fig. 11.

Locality.—Rare in the slates of Foylathurrig, Dingle, County Kerry; very common in the sandstone of Killey, Pomeroy, County Tyrone.

Orthis virgata. *Sow.*

Ref.—Sil. Syst. Pl. 20, fig. 15.

Locality.—In the limestone of Chair of Kildare, Kildare, County Kildare; very common at Grangegeeth, County Meath; common in the slates of Tieravane, Dingle, County Kerry; common in the schists of Knockmahon, Tramore, County Waterford.

Spirifer bigugosa. *M'Coy.* (Pl. III. fig. 23).

Sp. Ch.—Rotundato-quadrate, gibbous; length two-thirds the width; mesial ridge large, tumid, rounded; cleft by a mesial sulcus; mesial hollow deep, rounded; sides with from eight to twelve obtusely angular, simple ribs; surface crossed by lines of growth; hinge-line equal to the width of the shell; cardinal area low, triangular.

This species is remarkable for having its mesial ridge divided in two by a mesial sulcus, in which it agrees with the *S. bifidus*, Roemer, from which it differs in the lateral ribs being less numerous, and not branched, as in that species. The mesial hollow is sometimes simple, and sometimes has a slender mesial ridge. In finely-preserved examples the striæ of growth are regular and prominent; the greater width of the triangular car-

dinal area, and greater number of lateral plaits, distinguish this from the *S. chama*, Eichw., the area in that species being very narrow, and with parallel sides, and about six plaits on each side. Length nine lines; width one inch two lines; height of cardinal area two lines.

Locality.—Very abundant in the shales of Doonquin, Dingle, County Kerry; very common in the slates of Ferriter's Cove, Dingle, County Kerry.

Spirifer crispus. *Dal.* sp.

Ref.—Pl. 3, fig. 6. Sil. Syst. Pl. 12, fig. 8.

Locality.—Common in the greenish slates of Doonquin, Dingle, County Kerry; common in the slates of Ferriter's Cove, Dingle, County Kerry.

Spirifer interlineatus. *Sow.*

Ref.—Sil. Syst. Pl. 6, fig. 6.

Locality.—Common in the slates of Ballyaglish, County Kerry; abundant in the slates of Doonquin, Dingle, County Kerry.

Spirifer lynx. *Eichw.* var. (Pl. III. fig. 25).

Locality.—Common in the shale of Chair of Kildare, Kildare, County Kildare; common in the schists of Kildermot, Gorey, County Wexford.

Spirifer octoplicatus. *Sow.*

Ref.—Sil. Syst. Pl. 12, fig. 7.

Locality.—Common in the slates of Ballyaglish and Doonquin, Dingle, County Kerry; common in the slates of Ferriter's Cove, Dingle, County Kerry.

Spirifer ovatus. *M'Coy.* (Pl. III. fig. 24).

Sp. Ch.—Longitudinally ovate; length and width nearly equal, depressed; hinge-line less than the width of the shell; beaks small; mesial ridge broad, rounded, defined; mesial hollow wide, shallow, undefined; surface radiated with very numerous, irregular, branching, cord-like ridges.

This is the largest Silurian *Spirifer* with which I am acquainted; it much resembles the Devonian *Spirifer disjuncta*, Sow., from all the varieties of which it is distinguished by its greater depression, greater length in proportion to the width, smaller beaks, and shorter hinge-line. Length of ventral valve two inches five lines; dorsal valve longer; width two inches four lines.

Locality.—Not uncommon in the grey slate of Cappacorcogue, Cong, County Galway; common in the shale of Egool, Ballaghaderreen, County Mayo.

Spirifer radiatus. *Sow.*

Ref.—Sil. Syst. Pl. 12, fig. 6.

Locality.—In the calcareous slate of Ardaun, Cong, County Galway; common in the slates of Doonquin, Dingle, County Kerry; common in the slates at Foylathurrig, Dingle, County Kerry; in the slates at Kilbride, Cong, County Galway; in the slates of Slieve Roe, Rathdrum, County Wicklow.

SPIRIFER SPECIOSUS. *Schlot.*

Ref.—Pl. 16, fig. 1.

Locality.—Very common in the slates of Ferriter's Cove, Dingle, County Kerry.

SPIRIFER TEREBRATULIFORMIS. *M'Coy.* (Pl. III. fig. 26).

Sp. Ch.—Suborbicular; both valves equally convex; length three-fourths the width; depth half the width; hinge-line shorter than the width of the shell; cardinal area triangular: a broad, square, mesial elevation in the ventral valve, and a corresponding hollow in the dorsal; mesial furrow having, in most specimens, three strong, rounded ridges near the beak, the two outer of which branch after some distance, so that there are five, nearly equal, at the margin; the sides have each three ribs near the beak, all of which branch, so that there are about six at the margin on each side.

This fossil strongly resembles several fossil species of *Terebratula* and *Atrypa* (e. g. *A. crassicostis*, Dal., as figured by Hisinger, from which it differs in having fewer and more distinctly branched lateral ribs), but is a true *Spirifer*. Even if the cardinal area were concealed, the number and disposition of the ribs would not agree with any described fossil. It is most allied to the *S. Panderi*, Ver., which has the same resemblance to *Terebratula*, but is easily distinguished by its large mesial elevation, and distinctly branched ribs. Length eight lines; width eleven lines.

Locality.—Very common in the limestone of Chair of Kildare, Kildare, County Kildare; in the dark limestone and slate of Portrane, Malahide, County Dublin.

SPIRIFER TRIDENS. *M'Coy.* (Pl. III. fig. 27).

Sp. Ch.—Subrhomboidal, gibbous, twice as wide as long; mesial elevation composed of three large, angular plaits; mesial hollow wide and deep; sides rather suddenly attenuated, radiated with about ten small, entire, rounded ridges on each side.

This *Spirifer* is remarkable for the great size of the three angular mesial plaits, those of the sides being much smaller, entire, and rounded; this great disproportion in size, as well as the greater number and roundness of the lateral ribs, serves to distinguish it permanently from the *S. lynx*. Length five lines; width ten lines.

Locality.—Common in the calcareous sandstone of Boocaun, Cong, County Galway; common in the impure calcareous schists at Knockmahon, Tramore, County Waterford.

PENTAMERUS OBLONGUS. *Sow.*

Ref.—Sil. Syst. Pl. 19, fig. 10.

Locality.—In the sandstone of Boocaun, Cong, County Galway (very abundant in one bed); in the sandstone of Cappacorcogue, Cong, County Galway.

ATRYPA ASPERA. *Sow.*

(Not of *Schlot.*—VAR. of *A. reticularis.*) *Ref.*—Sil. Syst. Pl. 12, fig. 5.

Locality.—In the slates of Ballyaglish, County Kerry; very common in the slates of Doonquin, Dingle, County Kerry; in the calcareous slates at Egool, Ballaghaderreen, County Mayo; common in the green slates of Ferriter's Cove, Dingle, County Kerry; common in the slates of Foylathurrig, Dingle, County Kerry.

ATRYPA BIDENTATA. *His.*(?).

Ref.—Sow. Sil. Syst. Pl. 12, fig. 13.

Locality.—Very common in the slates of Doonquin, Dingle, County Kerry; abundant in the slates of Ferriter's Cove, Dingle, County Kerry.

ATRYPA COMPRESSA. *Sow.*

Ref.—Sil. Syst. Pl. 13, fig. 5.

Locality.—Rare in the schists of Tirnaskea, Pomeroy, County Tyrone.

ATRYPA CUNEATA. *Dal.*

Ref.—Pl. 6, fig. 3.

Locality.—Rare in the sandstone of Shanballymore, Outerard, County Galway.

ATRYPA FILOSA. *M'Coy.* (Pl. III. fig. 28.)

Sp. Ch.—Transversely elliptical, gibbous; dorsal valve evenly convex; margin deflected, very much raised into a deep, rounded sinus in the front, and descending into deep lobes at the sides; the sinus does not extend beyond the margin, nor produce any corresponding ridge on the surface; ventral valve trilobed, having a very deep and wide mesial hollow from the beak to the margin, where it terminates in a tongue-shaped projection, corresponding to the sinus in the margin of the dorsal valve; surface finely and regularly striated from the beaks; striæ equal, thread-like.

This species in form resembles the *A. undata*, Sow., but is easily distinguished by its strongly striated surface; and from the Russian *Spirifer reticulatus* it is distinguished by the mesial hollow of the ventral valve extending to the beak, its more gibbous dorsal valve, not marked with a mesial ridge, and the simplicity of the striation. Length eleven lines; width one inch ten lines.

Locality.—Rare in the schists at Knockmahon, Tramore, County Waterford.

ATRYPA GLOBOSA. *Sow.*(?)

Ref.—Sil. Syst. Pl. 22, fig. 26.

Locality.—Imperfect casts in the shale of Chair of Kildare, Kildare, County Kildare; in the grey calcareous slates of Coolin, Cong, County Galway.

ATRYPA HEMISPHERICA. *Sow.*

Ref.—Sil. Syst. Pl. 20, fig. 7.

Locality.—In the calcareous slates of Ardaun, Cong, County Galway; very common in the sandstone of Blackwater Bridge, Leenane, County Galway; common in the sandstone of Boocaun, Cong, County Galway; in the slates at Cappacorcogue, Cong, County Galway; in the slates at Glencraff, Leenane, County Galway;

Kilbride, Cong, County Galway; very abundant in the grey sandstone of Lettershanbally, Maume, County Galway; common in the grey calcareous sandstone of Muntrowen, Leenane, County Galway; in the sandstone of Shanballymore, Cong, County Galway; abundant in the sandstone of Tonlegee, Cong, County Galway.

ATRYPA IMBRICATA. *Sow.* SP.

Ref.—Sil. Syst. Pl. 12, fig. 12.

Locality.—Rare in the limestone of Chair of Kildare, Kildare, County Kildare.

ATRYPA LACUNOSA. *Sow.* SP. (*Not of Continental authors*).

Ref.—Sil. Syst. Pl. 5, fig. 19.

Locality.—In the slates at Ardaun, Cong, County Galway; in the sandstone of Boocaun, Cong, County Galway; in the slates of Ferriter's Cove, Dingle, County Kerry; in the coarse schists of Tirnaskea, Pomeroy, County Tyrone.

ATRYPA NAVICULA. *Sow.* SP.

Ref.—Sil. Syst. Pl. 5, fig. 17.

Locality.—Not uncommon in the limestone of Chair of Kildare, Kildare, County Kildare; common in the slates of Doonquin, Dingle, County Kerry; abundant in the slates of Glounmore, west of Ventry Harbour, County Kerry; rare in the slates of Glencraff, Leenane, County Galway; very rare in the schists of Tirnaskea, Pomeroy, County Tyrone; in the slates of Tieravane, Dingle, County Kerry.

ATRYPA NUCULA. *Sow.* SP.

Ref.—Sil. Syst. Pl. 3, fig. 1.

Locality.—Not uncommon in the slates at Doonquin, Dingle, County Kerry; in the slates at Foylathurrig, Dingle, County Kerry.

ATRYPA ORBICULARIS. *Sow.*

Ref.—Sil. Syst. Pl. 19, figs. 3, 4.

Locality.—Common in the grey slates of Cappacorcogue, Cong, County Galway; in the grey slates of Coolin, Cong, County Galway; common in the grey calcareous slate at Kilbride, Cong, County Galway.

ATRYPA PULCHRA. *Sow.* SP.

Ref.—Sil. Syst. Pl. 5, fig. 21.

Locality.—Common in the slates of Doonquin, Dingle, County Kerry; common in the green slates of Ferriter's Cove, Dingle, County Kerry.

ATRYPA RETICULARIS. *Linn.* SP.

Ref.—A. affinis. Sow. Min. Con. Pl. 324, fig. 2.

Locality.—Abundant in the slates of Ballyaglish, County Kerry; in the slates of Coolin, Cong, County Galway; very common in the slates of Doonquin, Dingle, County Kerry; abundant in the slates of Ferriter's

Cove, Dingle, County Kerry; very common in the slates of Foylathurrig, Dingle, County Kerry; in the slates of Glencraff, Leenane, County Galway; common in the slates of Tieravane, Dingle, County Kerry.

ATRYPA ROTUNDATA. (? VAR.) *Münst.* SP.

Ref.—Beitr. Heft. 3. Pl. 14, fig. 3.

Locality.—Rare in the grey calcareous slates of Ardaun, Cong, County Galway; in the slates of Kilbride, Cong, County Galway.

ATRYPA SERRATA. *M'Coy.* (Pl. III. fig. 29).

Sp. Ch.—Transversely rhomboidal, depressed; length two-thirds the width; edge sharp, crenulated by the ends of the radiating ridges; surface radiated by close, simple, obtuse ridges, all of which reach the beak; five of them raised with the flattened mesial ridge, forming a deep, square sinus in the front margin; sixteen or eighteen on each side.

This species is principally remarkable for the great number of its *simple* radiating ridges, which, together with the depression of the valves, gives a sharp, serrated appearance to the edge. The sinus in the front maring is very deep and square. It closely resembles the Russian *Spirifer rectus*, but has no cardinal area, and when that is concealed, may be distinguished from it by the fewer mesial, and more numerous lateral plaits. The *T. lacunosa*, Sow., to which it approaches, is distinguished by its fewer lateral plaits, and the mesial sinus reaching to the beak; the *T. Huotina*, so characteristic of the Devonian system in Russia, of which it may prove a variety, is distinguished by the strongly arched sides near the beak, larger mesial plaits, and more unequal valves. From both those shells, however, the present species seems to be permanently distinguished, although specific definitions of the plaited *Terebratulæ* are extremely difficult to frame. Length six lines; width nine lines. The young have no mesial furrow; the mesial hollow in the dorsal valve is shallow, and does not extend more than half-way to the beak; the mesial plaits are rather larger than the others, but this is almost the only character that varies.

Locality.—Common in the grey quartzites of Blackwater Bridge, Leenane, County Galway; common in the sandstone of Boocaun, Cong, County Galway; Bunowen, Leenane, County Galway; common in the slates of Cappacorcogue, Cong, County Galway; common in the slates of Glencraff, Leenane, County Galway; forming great masses in the sandstone of Lettershanbally, Maume, County Galway; very abundant in the grey calcareous sandstone of Munterowen, Leenane, County Galway; common in the sandstone of Tonlegee, Cong, County Galway.

ATRYPA SEXCOSTATA. *M'Coy.* (Pl. III. fig. 30).

Sp. Ch.—Triangular, depressed; front subtruncate, sides straight, margin very obtuse; surface with six large, angular, radiating ribs.

This curious species is closely allied to the *Terebratula quinquecostata* of the St. Cassian muschelkalk; but does not resemble any species of the Silurian, Devonian, or Carboniferous age. Length five lines; width of front four lines and a half.

Locality.—Not uncommon in the fine sandstone of Lettershanbally, Leenane, County Galway; in the sandstone of Shanballymore, Outerard, County Galway.

ATRYPA UNDATA. *Sow.*

Ref.—Sil. Syst. Pl. 21, fig. 2.

Locality.—In the shale of Chair of Kildare, Kildare, County Kildare.

ATRYPA WILSONI. *Sow.* SP.

Ref.—Min. Con. Pl. 118, fig. 3.

Locality.—Common in the slates of Doonquin, Dingle, County Kerry; common in the slates of Ferriter's Cove, Dingle, County Kerry; rare in the slates of Kilbride, Cong, County Galway.

CRUSTACEA.

TRILOBITA.

I have observed in several trilobites a peculiar pore situated in the furrow which separates the glabella from the cheeks, near the anterior margin on each side, which seems to have escaped general notice, and which it is not impossible may be the remains of setaceous external antennæ. On considering the division of the cephalic shield into head and thorax, it will be seen that those punctures occupy precisely the positions of the antennæ of many insects; and the antennæ, no matter how fine or hair-like, being always hollow organs, must necessarily leave a hole in the external integument if broken off. In *Ampyx* those punctures are extremely remarkable and obvious, and it is only in this group that they have, to my knowledge, been observed by naturalists, Capt. Portlock having noticed them, but without any remark, in the description of his *A. Sarsii;* they are to be seen, but not exactly in the right place, in his figure of that fossil, in which they form two, very deep, oblong punctures, communicating with the interior; they are situated in the furrows before-mentioned, about their own length within (or posterior to) the anterior margin. I have likewise observed them in all the species of the genus *Trinucleus.* In the *T. Caractaci* they form two rather large, circular punctures, as large as one of the punctures of the wings; they are in the furrows before mentioned, close to the anterior margin of the cheeks, and communicating with the interior; in the *T. seticornis* they form two small circular puncta, about twice their own diameter within the margin; they are in the same furrows, penetrate to the interior, and are smaller than the punctures of the wings; in the *T. radiatus* they hold the same position as in the *T. Caractaci*, that is, very close to the anterior margin of the cheeks. They are rather larger in the *T. elongata*, in which they occupy the same position as in the *T. Caractaci*, but are smaller, and placed rather more within the margin. In *T. fimbriatus*, though small, they are very conspicuous, being about the size of one of the punctures of the margin of the shield, and their own diameter within the margin. It is very remarkable that those organs are most obvious in what are considered *blind* Trilobites; whether it may be as a compensation for the want of eyes, that they are furnished with better developed antennæ,—organs seeming so mysteriously to combine in themselves the exercise of all the senses, besides their own *aeroscepsin*, as Lehmann calls it,—I am unable to conjecture. If those really be the remains of antennæ, I might, however, mention one fact bearing on their greater development in the absence of the true eyes,—it is, that the Rev. Mr. Kirby found, on powerfully magnifying the antennæ of the *Eucera* (or long-horned bee), that the last ten joints were composed of innumerable hexagons, similar to those forming the true eyes of those insects, and assisting, according to that able entomologist, in vision; they might, perhaps, have had a somewhat similar function in the present instance, but I only throw

out these observations in the hope of drawing the attention of others to the subject, as I conceive the affinities of the Trilobites have been made unnecessarily obscure by the too easy concession of their want of antennæ. That the punctures above alluded to exist, although very much reduced, in Trilobites with eyes, I have also ascertained, as they are found, although exceedingly minute, in the common *Griffithides globiceps* of the carboniferous limestone, holding the same position as in the other genera alluded to, being seated in the same furrows, but farther back from the anterior margin.

Tiresias. *M'Coy. New Genus.*

Gen. Ch.—Cephalothorax semioval, longitudinal; glabella very gibbous, pyriform, rounded in front, contracted into a narrow neck posteriorly; (obscure traces of two small, cephalothoracic furrows on each side); neck furrow very strong; cheeks triangular, gibbous, prolonged backwards into long, flattened spines; eyes none(?)

This remarkable Trilobite agrees nearly in form with the carboniferous genus *Griffithides*, Portk., except in being apparently blind. Only one species is as yet known to me.

Tiresias insculptus. *M'Coy.* (Pl. IV. fig. 1).

Sp. Ch.—Glabella transversely marked with fine undulating striæ, arched forwards in the middle; neck segment large, marked with transverse, flexuous striæ; cheeks tumid, having a slight sinus in the margin, near their junction with the glabella above, and having a shallow sulcus, extending on each side, directly from the base of the glabella to the lateral cheek margin, in a line at right angles to the axis; marked with slightly flexuous, longitudinal striæ.

The absence of any trace of facial suture leaves us, as in the case of *Ampyx*, rather uncertain as to whether the cephalic shield is really perfect; I should also add, that the absence of a distinct limb leaves a doubt on my mind on this point; however, even if eyes, eye-lines, and maxillary pieces, were to be found, yet the fossil would be generically and specifically distinct from any other I know of. Meanwhile, we must wait the discovery of additional specimens to increase our knowledge of the form. Length of glabella three and a half lines; width of cephalothorax five lines.

Locality.—Very rare in the limestone of Chair of Kildare, Kildare, County Kildare.

Remopleurides Colbii. *Portk.*

Ref.—Geol. Rep. Pl. 1, fig. 1.

Locality.—Not uncommon in the schists of Tirnaskea, Pomeroy, County Tyrone.

Remopleurides dorsospinifer. *Portk.*

Ref.—Geol. Rep. Pl. 1, fig. 3.

Locality.—Rare in the slates of Tirnaskea, Pomeroy, County Tyrone.
The tail-piece of this species is flattened, and terminates in four short, tooth-like spines.

Remopleurides laterispinifer. *Portk.*

Ref.—Geol. Rep. Pl. 1, fig. 2.

Locality.—Rare in the slates of Tirnaskea, Pomeroy, County Tyrone.

Remopleurides platyceps. *M'Coy.* (Pl. IV. fig. 2).

Sp. Ch.—Glabella much flattened, sides narrowed, twice as wide as long, exclusive of the nearly square, projecting lip in front; notch separating the lip on each side from the glabella very distinct, nearly rectangular; cheeks forming a narrow, semicircular margin to the sides of the glabella.

This is quite distinct from any of the Tyrone species of the genus, by the great width of the head, and the contraction and great width of the sides of the glabella; the head is also flatter than in the others. I have not as yet seen the wings or any part of the abdomen; the head, however, is so distinct from those described by Captain Portlock (all of which I have examined), that I have no hesitation in applying a new specific name to the species. Length of glabella four lines; width seven and a half lines; length of lip three-fourths of a line; width two lines; width of cheek in the centre rather less than half a line.

Locality.—Common in the slates of Carrickadaggan, seven miles south-east of New Ross, County Wexford; very common in the slates of Greenville, north of Enniscorthy, County Wexford.

Cheirurus(*a*) bimucronatus. *Murch.* sp.(?)

Ref.—Paradoxides bimucronatus. Sil. Syst. Pl. 14, figs. 8, 9.

Locality.—One doubtful fragment in the limestone of Chair of Kildare, Kildare, County Kildare.

Cheirurus brevimucronatus. *Münst.* sp.

Ref.—Paradoxides brevimucronatus. Beitr. Heft. 3, t. 5, fig. 12.

Locality.—Rare in the limestone of Chair of Kildare, Kildare, County Kildare.

Cheirurus gelasinosus. *Portk.* sp.

Ref.—Amphion gelasinosus. Geol. Rep. Pl. 3, fig. 4.

Locality.—Not uncommon in the limestone of Chair of Kildare, Kildare, County Kildare.

Sphœrexochus(*b*) calvus. *M'Coy.* (Pl. IV. fig. 10).

Sp. Ch.—Glabella large, hemispherical, very gibbous; neck-furrow strong, narrow; cephalothoracic furrows, three on each side of the glabella; the posterior pair very wide and deep, curved in a circular manner, and confluent both with the neck-furrow and with the deep furrow which encircles the glabella; the spaces enclosed by this pair of furrows form two large, circular, flattened tubercles, one on each side, separated by a portion of the glabella scarcely exceeding their own diameter; the anterior pair of furrows on each side very small, short, straight, less than half the diameter of the circular tubercles distant from each other and from the posterior furrows; length little more than the distance between them: portion of the cheeks within the eye-line very narrow in front, produced behind into a tongue-shaped process directed downwards, forwards, and outwards, its length being equal to about twice the diameter of the circular tubercles, and having a thickened or tumid mar-

(*a*) For this genus, see Beyrich, *loc. cit.*

(*b*) For the genus, see Beyrich, *loc. cit.*

gin; no upper eyelid; eyes and maxillary pieces (or portion of the cheeks exterior to the eye-lines) unknown; surface under the lens minutely granulated; thorax and tail unknown.

This curious little Trilobite bears an amusing resemblance to a human skull in miniature, whence the specific name. I have no doubt that this is the fossil figured by Hisinger, from the limestone of Furudal, Dalecarlia, as the *Calymene clavifrons* of Dalman; as, however, I entirely agree with all the Continental palæontologists in thinking the *C. clavifrons* of Dalman to be an entirely different species (allied to the *C. speciosus*), I have, of course, given a new specific name to the present fossil, when placing it in its proper genus. It differs from the Bohemian *Sphærexochus mirus*, Bey., in having three pair of cephalothoracic furrows, and in the small distance between the two circular spaces enclosed by the posterior pair.

Locality.—Extremely abundant in the limestone of Chair of Kildare, Kildare, County Kildare; large masses being often thickly studded with their little skull-like heads.

ACIDASPIS BISPINOSUS. *M'Coy*. (Pl. IV. fig. 7).

Sp. Ch.—Cephalothorax transversely oblong; glabella terminating posteriorly in two cylindrical spines, one from each side of the base, directed backwards; cheeks wider than long, convex, rounded at the sides, surrounded by a thickened, prominent margin, set with short, tooth-like spines on the outer edge; posterior lateral angles produced into strong, cylindrical spines, directed backwards and outwards; eyes large, prominent, situated rather in front of the middle of the cheeks; eye-line forming a thick, prominent ridge, extending obliquely from the junction of the anterior margin of the cheeks and glabella to the eye, and from thence, with a slight outward curve, to the external lateral angle on each side; surface minutely granulated, the granules of unequal size.

Since writing the above description of a fragment of the cephalic shield, I have seen numerous perfect specimens of the entire animal, which entirely bear out the views which I entertained from an examination of the only specimen which had then occurred; and having been kindly permitted to refer to those examples, I can more fully illustrate the characters of the species. This Trilobite is obviously congeneric with Mr. Murchison's *A. Brightii*, from which it differs as a species by the posterior elongation of the glabella, being, in the present species, forked, so as to terminate in *two* long, slender spines, from which I have named it, while, in that species, it is acutely pointed and triangular; and by the anterior margin of the cheeks not being plicated, as in that species, but entire, and set with small, conical spines, directed forwards and outwards. From the perfect specimens alluded to, I find that the glabella is wider behind than before, and furnished with two very large cephalothoracic tubercles on each side, the anterior smallest. The body is composed of eight segments (the first nearly concealed by the stomacher-like projection backwards of the glabella, marked by Mr. Murchison), each terminating in a long, slender, cylindrical spine, abruptly deflected nearly at right angles with the pleuripedes; pygidium small, semicircular, of two segments, each marked by a ridge similar to that of the pleuripedes, and terminating similarly in a slender, deflected spine on each side; the portion of the pygidium between these two segmental ridges flat, and furnished at the margin of the obtusely-rounded apex with six small, short spines, and two similar, small spines at the margin, between the first and second segmental spines, on each side; there seems to be, about the middle of the last segmental ridge, on each side, a broken tubercle, probably the remains of two spines directed upwards, as in the *Arges armatus*: all the segments are irregularly granulated. It will be observed, from the foregoing remarks, that this species has all the characters of the genus *Odontopleura*, Emmerich, and I can, therefore, with confidence, recommend the union of that genus with *Acidaspis*. Herr Burmeister has already suggested *Acidaspis* to be a synonyme of *Odontopleura*, but I am now certain of the fact, as the present species approaches much more closely to Mr. Murchison's than any of Emmerich's do, and the former name, being the oldest, ought to be retained. The present species

closely resembles the *Odontopleura ovata*(*a*), Em., but the pleuripedes only terminate each in one long, deflected spine at each side, instead of two short, nearly straight ones; it likewise differs from the *O. elliptica*, Bur., which it more nearly resembles in the character of the spines of the pleuripedes, by the greater number of spines to the margin of the tail, and the spinose, instead of tuberculated, margin of the cephalothorax; and from both species it strongly differs in the very forward, or nearly central position, of the eyes on the cheeks, and the course of the eye-line to the external angles, which form the best characters of this species.

Locality.—The specimen figured is from the limestone of Chair of Kildare, Kildare, County Kildare.

ENCRINURUS(*b*) MULTISEGMENTATUS. *Portk.* SP.

Ref.—Amphion multisegmentatus. Geol. Rep. Pl. 3, fig. 6.

Locality.—Not uncommon in the sandstone of Killey, Pomeroy, County Tyrone.

ENCRINURUS STOKESII. *M'Coy.* (Pl. IV. fig. 15).

Sp. Ch.—General form elongate, ovate, twice as long as wide; cephalothorax semioval; glabella pear-shaped, convex, rounded in front, gradually narrowing to the neck-segment, which is strongly marked; surface of the glabella studded with rather large, oval tubercles of unequal size; no cephalothoracic furrows, but three of the tubercles on each side seem larger than the rest, and mark their place; cheeks convex, triangular, tuberculated in the same manner as the glabella, having the large, prominent, conical eyes nearly in the middle, and having, likewise, three of the tubercles, larger than the rest, opposite those on the sides of the glabella; eye-lines extending direct from behind the eyes to the outer margin; wings extending backwards into broad, smooth, flattened spines, as far as the fifth segment of the abdomen; abdomen of twelve broad, smooth, segments; lateral lobes slightly wider than the axal one; extremities of the axal segments simple, not forming tubercles: pygidium triangular, pointed; axal lobe narrow, of about twenty-eight narrow, close segments; a smooth space down the middle of the lobe, on which is a row of about six or seven small tubercles; lateral segments about twelve, much longer than the axal ones, narrow, convex, much curved downwards, the lower ones inflexed or embracing the extremity of the axal lobe; intervening spaces as wide as the segments, concave, smooth.

The occurrence of a perfect specimen of this fine Trilobite enables me to clear up some of the confusion in which it seems to be involved. The tail, which occurs abundantly in the Silurian rocks of Ireland and Wales, is frequently named *Amphion*, or *Calymene*, *punctata*, while the head is as frequently called *Calymene variolaris*, and the body seldom named at all; perfect specimens, with those parts in contact, not seeming to have occurred to recent writers. With regard to the *Entomostracites punctatus* of Wahlenberg, the tail resembles that of the present animal, but offers some points of apparent difference: the head he has given is entirely distinct, and, if it really belonged to the tail, would settle the question at once; and if, as I suspect, the head and tail belong to *different genera*, a species so constructed is of little importance. The next question of the identity of this fossil with *Calymene variolaris* demands a more careful consideration. This species has been founded by Brongniart on two trilobites, belonging, obviously, to two distinct generic groups; one of them is generically identical with the fossil before us; and, except that the segments of the abdomen (thorax of some writers) are represented as tuberculated, and the greater width, in proportion to the length, would seem identical in species. This is his, Pl. I. fig. 3, A, and is from a drawing by Mr. Stokes, to whom I have dedicated the present species, as the first who figured an entire specimen of this group: the original figure of *Asaphus tuberculatus*, Buck. (B. T. Pl. 46,

(*a*) I have retained the name originally given to this species by Emmerich in his *De Trilobitis Dissertatio Petrefact. Inauguralis, &c.*, in preference to the more appropriate one, *O. bispinosa*, which he has since proposed, the former name having the priority, and having passed into general use.

(*b*) For this genus, see Emmerich, *loc. cit.*, and also Scientific Memoirs, vol. iv. part xiv.

fig. 6), seems to have been drawn from the same specimen, and to confirm the accuracy of Mr. Stokes' drawing; the other, which seems to have formed the real subject of Brongniart's description, resembles the *C. Blumenbachii* in its abdomen and pygidium, but has the cephalothorax divided into three very gibbous, strongly tuberculated lobes, without cephalothoracic furrows; and in his description he expressly mentions that the *C. variolaris* has the segments of the abdomen and tail exactly as in the *C. Blumenbachii*, which settles the question of which species his name should be retained for; the entire specimen, also, figured by Mr. Murchison as *C. variolaris*, has the same structure of head, abdomen, and tail. I have been obliged, therefore, to propose a new name for the present species, the peculiarities of which do not seem to have been at all noticed by Brongniart, although its pygidium is of so singularly different a construction from the abdomen; and I think this course preferable to using the name *punctata*, which I think it extremely doubtful could belong to this, as, in that species, the three rows of tubercles are so distinctly insisted on by Wahlenberg and Dalman; and their figures offer other points of difference, which will be obvious on a careful comparison, and to which I attach the more importance, from having found a considerable diversity among tails of this construction, contrary to the general impression. I am at present acquainted with five distinct species of tails of this general form, all of which may have passed as *C. punctata;* one, in particular, is scarcely to be distinguished from the species I have figured; the side furrows of the tail are somewhat fewer, and meet the middle lobe at a more acute angle; yet this trifling difference in the tail I find to be accompanied by strongly ridged and tuberculated body segments, all of which terminate in long, deflexed, cylindrical spines, totally unlike the present animal; yet I am acquainted with perfect specimens of both species, having the head, body, and tail in contact: another smaller species has the segmental ridges continuous across the three lobes, and closely set with transverse rows of equal tubercles; another, the *multisegmentatus* of Portlock, has no central row of tubercles, and another has them double. Length of the entire animal two inches three lines; of glabella seven lines; width of cephalothorax one inch one line; length of pygidium seven and a half lines. The specimen figured is from Ferriter's Cove, Dingle, County Kerry: fragments are abundant in various localities, and have a great geological range.

Locality.—Common in the calcareous slates of Ardaun, Cong, County Galway; common in the sandstone of Boocaun, Cong, County Galway; in the grey slates of Cappacorcogue, Cong, County Galway; common in the dark grey slates of Egool, Ballaghaderreen, County Mayo; common in the green slates of Ferriter's Cove, Dingle, County Kerry; in the grey, calcareous slates of Glencraff, Leenane, County Galway; in the slate of Kilbride, Cong, County Galway; in the sandstone of Lettershanbally, Maume, County Galway; in the sandstone of Munterowen, Leenane, County Galway; in the slates of Newtown Head, County Waterford; in the sandstone of Shanballymore, Cong, County Galway; in the sandstone of Tonlegee, Cong, County Galway.

CALYMENE ARENOSA. *M'Coy.* (Pl. IV. fig. 12).

Sp. Ch.—Glabella elongate, ovate, convex; base much contracted, rounded, divided by a deep furrow from the cephalothoracic furrows and tubercles, which are very distinctly marked; cheeks very wide, gently convex, triangular; each cheek exceeds the length of the glabella by about one-half in width; eyes ("oculi hiantes") at the height of the upper cephalothoracic tubercle, rather less than their own diameter from the glabella; entire surface of cephalothorax as if sanded, very minutely granulated, with larger, sharp, scattered tubercles of extremely irregular size and distribution.

The glabella of this Trilobite varies something in form, being, in some specimens, clavate, or broadly rounded in front, as in *Phacops*, in others more narrowed, as in *Calymene;* the course of the facial suture, however, fixes the genus. It differs from the allied species of *Phacops*, *Amphion*, and *Calymene*, by the minuteness and irregularity of its sand-like granulation and the width of its cheeks. Length of small specimens of cephalothorax two lines (often five lines); width seven and a half lines.

Locality.—Very common in the shale of Ballygarvan Bridge, New Ross, County Wexford; abundant in the slates of Greenville, Enniscorthy, County Wexford.

Calymene Blumenbachii. β. pulchella. *Dal.*

Ref.—Palæad. Pl. 1, fig. 3.

Locality.—Not uncommon in the gray calcareous slates of Glencraff, Leenane, County Galway; rare in the grey calcareous sandstone and slates of Munterowen, Leenane, County Galway.

Calymene brevicapitata. *Portk.*

Ref.—Geol. Rep. Pl. 3, fig. 3.

Locality.—One specimen of this species, or variety, has occurred in the slates of Egool, Ballaghaderreen, County Mayo.

Calymene(?) forcipata. *M'Coy.* (Pl. IV. fig. 14).

Sp. Ch.—Glabella slightly convex, length about one-third more than the width of the base, front rounded, entire, narrower than the base; axal furrows very strong, deep; cephalothoracic furrows forming three strong, rounded tubercles on each side of the glabella, the anterior smallest; cheeks wide, flattened; eyes distant from the glabella less than half its width, and about the same distance from the posterior margin of the shield as the second cephalothoracic tubercle; anterior part of the shield forming a broad, subtruncate, concave margin in front of the glabella, and about one-third the length of the glabella in length; eye-lines extending behind, from the eye to the external angle of the cheek on each side: pygidium, axal lobe narrow, convex, of six simple segments; side-segments flattened (apparently simple, and about one-third longer than the width of the axal lobe, but the margin or extremities imperfect); tail terminating in one large, flattened, entire, lozenge-shaped plate, which ends posteriorly in two long, incurved, flattened points, having a forked or forceps-like appearance; the axal lobe only extends about one-third the length of this plate, terminating obtusely, but the axal furrows are produced and curved, the convexities of the curves towards each other, or inwards, their extremities nearly join those of a pseudo-segmental furrow on each side, which curves in the opposite direction, so as to enclose a slightly convex, ovate space on each side; surface smooth, or very minutely granulated.

This curious species, so far as the heads are concerned, certainly belongs to *Calymene;* those have been taken for *C. Blumenbachii*, from which it is easily distinguished by the broad flattened plate-like expansion of the shield in front of the glabella; in this character it closely approaches the *C. Tristani*, from which it differs in the shorter glabella, and in the eyes being much nearer to the posterior margin; the tails, however, differ entirely from any of *Calymene* with which I am acquainted, although more closely resembling the allied genus *Phacops*, or rather that part of it called *Dalmania*, by Emmerich, in which the terminations of the tails are extremely various, and to which the *Odontocephalus selenurus* of the American geologists seem to belong; this latter is the most nearly allied form to our species, from which it is easily distinguished by the axal lobe of the tail terminating simply and abruptly in the smooth portion of the margin near the forked apex, the axal furrows simply encircling it as in most ordinary Trilobites, while in the present species the end of the axal lobe is obscurely defined, for the axal furrows are produced, and curved outwards, and by nearly meeting the points of the next (last) pseudo-segmental furrow, enclose a small ovate space on each side, precisely as in most species of *Lichas*.

Locality.—Very abundant, of various sizes, in the fine slates of Slieve Roe, Rathdrum, County Wicklow.

Calymene variolaris. *Murch.* (*Brongn. pars.*)

Ref.—Sil. Syst. Pl. 14, fig. 1.

Locality.—Rare in the grey calcareous slates of Kilbride, Cong, County Galway; rare in the green slates of Ferriter's Cove, Dingle, County Kerry.

Forbesia. *M'Coy. New Genus.*

Gen. Ch.—Cephalothorax truncato-orbicular; glabella large, narrower in front than behind, marked on each side with two or three cephalothoracic furrows; cheeks small, prominent, not (apparently) produced backwards into spines at the angles; eyes large, reniform, close to the glabella; eye-lines vertical, or running direct from the limb, or tumid front margin, to the anterior angle of the eye-lid, and from the posterior angle of the eye-lid direct to the posterior margin, near the base of the glabella; neck segment strong, terminating at each end in a large, oblique tubercle; body contractile, of eleven segments, those of the axis simple, terminating in a small tubercle at each end, those of the sides strongly furrowed, sharpened at the anterior margin, and obtusely subtruncate at their extremities; pygidium semioval, of ten segments, the axal ones simple, the lateral ones furrowed; margin entire.

This interesting genus is intermediate, in some of its characters, between *Phacops* and *Calymene*, while it has others peculiar to itself. It resembles *Phacops* in having only eleven segments in the abdomen, but differs from it in the glabella being wider behind than before, in the form of the angles of the cheeks, and in the direction of the eye-line behind the eye, which, in *Phacops*, runs to the outer margin, considerably in front of the angle, and nearly parallel with the posterior margin, while in *Forbesia* it runs directly to the posterior margin, or at right angles to the course taken in *Phacops*. It resembles *Calymene* in having the glabella wider at the base than in front, in the form and structure of the segments of the body and tail, and in the form of the angles of the cheeks, but differs in the spaces between the cephalothoracic furrows not swelling into tubercles, in the course of the eye-line, behind the eye, which runs to the external angle (the figure of *C. major*, Sil. Syst. Pl. 7, fig. 6, is erroneous in this respect), instead of the direction indicated for this genus, and in having but eleven, instead of thirteen segments to the body. I do not recollect any other group, in which the neck segment terminates in the large, distinct tubercle of this genus. There are at present two species known to me, having all those generic characters in common, one, of which an imperfect specimen is figured by Burmeister (*loc cit.* Pl. V. fig. 9, a.) as new, under the name *Trilobites verticalis*, the genus being undetermined, and the species named from the remarkable vertical course of the eye-lines, which I have shewn to be a generic character, and the following new species.

I have dedicated the genus to my friend, Professor E. Forbes, Palæontologist to the Geological Survey of Great Britain, &c.

Forbesia latifrons. *M'Coy.* (Pl. IV. fig. 11).

Sp. Ch.—Longitudinally oval, width two-thirds the length; side lobes about one-third wider than the axal lobe: cephalothorax; glabella subtrigonal, prominent, but flattened above, length and width of the base equal; front rounded, narrower than the base; sides with two (three?) short, very obscurely marked cephalothoracic furrows on each side; neck furrow very strongly marked, terminating at each end in a large, flattened, oblique tubercle; cheeks very prominent, triangular, nearly twice as long as wide; eyes large, reniform, close to the glabella; eye-line descending perpendicularly to the lower margin of the cheeks, and then turns abruptly outwards at its extremity; margin rather broad; abdomen of eleven segments, those of the axal lobe terminating in prominent tubercles; side segments compound; pygidium semi-oval; axal segments ten, simple; lateral segments divided by a groove, extending rather more than half-way from the margin; margin entire, even.

This is distinguished from the other species (*Forbesia verticalis*) by its almost obsolete cephalothoracic furrows, and its much wider glabella and narrower cheeks. I believe the surface is smooth, but cannot speak positively. Length of entire animal eight lines; width five lines; length of glabella two lines;

width at base two and a half lines; length of pygidium two lines; width four and a half lines; of axal lobe one and a half lines.

Locality.—Common in the shale of Egool, Ballaghaderreen, County Mayo.

Phacops Brongniarti. *Portk.*

Ref.—Geol. Rep. Pl. 2, fig. 8.

Locality.—Rare in the schists of Bardahessiagh, Pomeroy, County Tyrone.

Phacops Dalmanni. *Portk.*

Ref.—Geol. Rep. Pl. 2, fig. 7.

Locality.—Rare in the slates of Greenville, Enniscorthy, County Wexford.

Phacops Jamesii. *Portk.*

Ref.—Geol. Rep. Pl. 3, fig. 10.

Locality.—Occurs in extraordinary abundance in the schists of Knockmahon, Tramore, County Waterford. When *perfect* it always exhibits the projecting front of the *P. Brongniarti*, Portk., which, in fact, differs in no respect that I can perceive, after the examination of many specimens. I, however, leave the matter as I find it for the present.

Phacops Murchisonii. *Portk.*

Ref.—Geol. Rep. Pls. 2 and 3, fig. 9.

Locality.—Common in the schists of Knockmahon, Tramore, County Waterford.

Phacops truncatocaudatus. *Portk.*

Ref.—Geol. Rep. Pl. 2, figs. 1–4.

Locality.—Extremely common in the schists of Bardahessiagh and Tirnaskea, Pomeroy, County Tyrone; in the sandstone of Killey, Pomeroy, County Tyrone.

Portlockia. *M'Coy. New Genus.*

Gen. Ch.—Cephalothorax truncato-orbicular, lateral angles not produced into spines; glabella large, clavate, widest in front, reaching to the margin, contracting to a narrow neck behind; neck furrow strong; cheeks rather small, triangular, convex; eyes large, reniform: abdomen of thirteen segments, rounded at their extremities, anterior margin sharpened for contraction; pygidium semi-elliptical, of seven simple segments; margin entire, smooth.

The species of this extremely natural and easily recognised group are allied to *Phacops* by the structure of the eyes, and having the glabella wider in front than at the base, and they have been placed in that genus by Captain Portlock. Mr. Murchison and most others have placed them in *Calymene*, with which they agree better in the number and structure of the segments of the body, which are only eleven in *Phacops*, but thirteen in *Calymene* and the present group. From both genera *Portlockia* is very remarkably distinguished, by the absence of the important cephalothoracic furrows on the sides of the glabella. I am, as yet, ignorant of the

course of the eye-lines behind the eyes in this genus, none of the specimens at my disposal shewing any trace of them; those possessed of better specimens can, doubtless, clear up this point.

Professor Goldfuss(*a*) has noticed this group, but proposes to limit to it Emmerich's name, *Phacops*. Emmerich himself protests strongly against this course, which would be productive of much inconvenience, as his name is in common use for a different set of forms. Captain Portlock has also recognised the group, but not characterized or named it. I dedicate the genus to him, as a small token of respect and esteem for a most philosophic and accurate writer on those creatures. The genus includes the *Calymene tuberculata* and *C. macrophthalma* of the Silurian system; *Phacops tuberculata* of Captain Portlock's Report; *Calymene nupera*, Hall; *Calymene bufo*, Green, &c.

Portlockia sublævis. *M'Coy.* (Pl. IV. fig. 13.)

This species is distinguished from the above by the small size of the eyes, and the minuteness of the granulation of the head, which is, in consequence, nearly smooth to the naked eye. The *Calymene granulata*, Münst., which it closely resembles, is distinguished by having (though not very distinctly expressed in his figure) like the *Phacops protuberans*, a small, cephalothoracic lobe on each side, above the neck segment. Length of the entire animal, six lines; width four lines; length of glabella two lines.

Locality.—Not uncommon in the sandstone of Ardaun, Cappacorcogue, and Tonlegee, Cong, County Galway.

Lichas Hibernica(*b*). *Portk.* sp.

Ref.—Nuttainia Hibernica. Portk. Geol. Rep. Pl. 4, fig. 1.

Locality.—Common in the limestone of Chair of Kildare, Kildare, County Kildare; rare in the grey slate of Coolin, Cong, County Galway; not uncommon in the slates of Tirnaskea, Pomeroy, County Tyrone.

Lichas laxata. *M'Coy.* (Pl. IV. fig. 9).

Sp. Ch.—Cephalothorax depressed, nearly semicircular, front not deflected; surrounded by a flat border or wing, the entire of which is in one plane; glabella slightly convex, very wide, rounded in front, constricted in the middle by the second pair of cephalothoracic furrows to about one-third the width of the front, widening towards the base to half the width of the front; neck furrow strong; neck segment flat, twice as wide as long; first lateral lobe small, rounded, at the base of the glabella; second lateral lobe, an ovate, flattened, or slightly convex space, rather more than half the length of the glabella, equal in width to the base of the glabella: cheeks narrow, triangular, flat, each bearing a small, reniform eye near the outer margin; surface minutely tuberculated.

This species is remarkable for having the entire margin of the cephalothorax in one plane, as in ordinary Trilobites, the front not being bent over, as in the *L. Hibernica*, Portk. sp., or *L. pumila*, M'Coy. Length of cephalothorax five lines; width eight lines.

Locality.—Common in the slates of Ballygarvan Bridge, New Ross, County Wexford; in the slates of Carrickadaggan, New Ross, County Wexford; common in the slates of Greenville, near Enniscorthy, County Wexford; and occasionally found, of large size, with the more common *L. Hibernica*, in the limestone of Chair of Kildare, Kildare, County Kildare.

(*a*) Systematische Uebersicht der Trilobiten, &c. See Leonhard und Bronn's Neues Jahrbuch, &c., for 1843. Seite 537. I have not this paper at hand just now, and give the reference from Burmeister's Systematische Uebersicht der Arten, page 140.

(*b*) The researches of Herren Lovén, and Beyrich, leave no doubt on my mind that those complex Trilobites should all be referred to Dalman's old genus, *Lichas;* and, in consequence, those names should be dropped which have been proposed for them by later authors, such as *Arctinurus* of De Castelnau, *Metopias* of Eichwald, *Nuttainia* of Eaton and Portlock, and *Platynotus;* although I think the *Platynotus Boltoni* of the American writers may be distinct as a species.

Lichas pumila. *M'Coy.* (Pl. IV. fig. 8).

Sp. Ch.—Cephalothorax; glabella slightly convex, the anterior third of its length deflected in front, very broad anteriorly, narrowing to about one-fourth the width of the front in the middle, widening again towards the base, where the bounding lines (vertical furrows) seem to terminate, on each side, in a large, trigonal, flattened tubercle, formed by the retroflexion of the basal pair of side furrows; first side lobe, or space enclosed on each side by the retroflexion of the very long, anterior, side, or cephalothoracic pair of furrows, in this species, forms a large, prominent, ovate tubercle on each side, fitting into the concave sides of the glabella, the anterior half being deflected, or doubled over, along with the front of the glabella; posterior pointed end on each side reaching to the lobe formed by the bending back of the posterior side furrow, about one-third wider than the narrow portion of the glabella: cheeks triangular, slightly convex, bearing two large, reniform eyes, close on each side to the first lateral lobe or tubercle; surface minutely granulated.

This curious little species is easily distinguished from the *L. Hibernica* by its small size, the ovate or tubercular form of the first lateral lobe, and its greater width when compared with the centre of the glabella, which latter is much more constricted, or narrower, in proportion to the front, of which it is only about one-fourth the width; the structure of the cheeks is also quite distinct.

Locality.—Not uncommon in the slates of Carrickadaggan, seven miles south-east of New Ross, County Wexford.

Brontes Hibernicus. *Portk.*

Ref.—Geol. Rep. Pl. 5, fig. 8.

Locality.—Rare in the schists of Tirnaskea, Pomeroy, County Tyrone.

Brontes signatus. *Phil.*

Ref.—Pal. Foss. Pl. 57, fig. 255.

Locality.—Rare in the dark grey slates of Egool, Ballaghaderreen, County Mayo.

Ogygia Murchisoniæ. *Murch.*

Ref.—Sil. Syst. Pl. 25, fig. 3.

Locality.—The nearly membraneous head and caudal shields occur rarely in the slates and grits of Carrickadaggan, New Ross, County Wexford.

Asaphus Buchii. *Brongn.* (*A. dilatatus. Dal.*)

Ref.—Portk. Geol. Rep. Pl. 24, fig. 3.

In deference to Capt. Portlock, I have allowed this reference to remain for a large *Asaphus* which occurs in great numbers in the slates north of Newtownhead, County Waterford. Most authors agree that Dalman's *A. dilatatus* is a mere synonyme of Brongniart's *A. d. Buchii;* but even allowing that they are different, still the Irish specimens differ from both in the much wider and more obtuse axal lobe, and the very wide, smooth margin of the pygidium. It would, perhaps, be more correct to refer them to the *A. Corndensis*, but as that is a species with which I am but imperfectly acquainted, I prefer leaving the matter as it stands for the present.

ASAPHUS LATIFRONS. *Portk.*

Ref.—Geol. Rep. Pl. 7, figs. 5, 6.

Locality.—Rare in the schists of Tirnaskea, Pomeroy, County Tyrone.

ASAPHUS MARGINATUS. *Portk.*

Ref.—Geol. Rep. Pl. 7, fig. 7.

Locality.—Rare in the slates of Boocaun and Coolin, Cong, County Galway; not uncommon in the slates of Greenville, Enniscorthy, County Wexford; rare in the grey quartzites of Lettershanbally, Maume, County Galway.

HOMALONOTUS OPHIOCEPHALUS. *M'Coy.* (Pl. IV. fig. 4).

Sp. Ch.—Cephalothorax subtrigonal, length two-thirds the width, gibbous in the middle, depressed and concave at the sides and margin; front narrow, subtruncate, rounded; eyes forming two prominent, oval, tubercles, placed close to the anterior margin, within the rounded angles of the front; posterior lateral angles broadly rounded; the middle of each side has an obtuse, convex wave, with a slight sinus at each end, before merging into the front or lateral angle; eye-lines extending from the eyes obliquely outwards and downwards to the small marginal sinus between the convex portion of the sides and the rounded, lateral angles; surface apparently smooth.

This interesting species is remarkable for its small size, and the very forward position of the eyes, which, in position, resemble nostrils rather than eyes, and, with the general form of the cephalothorax, give it the aspect of a little snake's head, whence the specific name; the front is proportionably blunter than in the other species; the margin is narrow, slightly thickened, and has a shallow sulcus within it, as far as the junction of the convex wave of the side with the rounded lateral angle; the whole of the mesial portion of the cephalothorax is very gibbous and rounded, but the sides are rather concave. Length three and a half lines; width five lines.

Locality.—Rare in the limestone of Chair of Kildare, Kildare, County Kildare.

ISOTELUS GIGAS. *Dekay.*

Ref.—Portk. Geol. Rep. Pl. 7, fig. 1.

Locality.—Rare in the schists of Bardahessiagh, Pomeroy, County Tyrone.

ISOTELUS POWISII. *Murch.*(?). VAR.

Ref.—Portk. Geol. Rep. Pl. 6, fig. 1.

Locality.—Rare in the fine slates of Rathdrum, County Wicklow.

ISOTELUS RECTIFRONS. *Portk.*

Ref.—Geol. Rep. Pl. 9, fig. 1.

Locality.—Rare in the schists of Tirnaskea, Pomeroy, County Tyrone.

Illænus centrotus. *Dal.*

Ref.—Palæad. Pl. 5, fig. 1.—Portk. Geol. Rep. Pl. 10, figs. 3–6.

Locality.—Common in the schists of Bardahessiagh, Pomeroy, County Tyrone; common in the limestone of Chair of Kildare, Kildare, County Kildare; rare in the calcareous slates of Coolin, Cong, County Calway; rare at Kilbride, Cong, County Galway.

Illænus perovalis. *Murch.*

Ref.—Sil. Syst. Pl. 23, fig. 7.

Locality.—Rare in the limestone of Chair of Kildare, Kildare, County Kildare.

Otarion obtusum. *M'Coy.* (Pl. IV. fig. 6).

Sp. Ch.—Cephalothorax semicircular, twice as wide as long, slightly pointed at front; glabella not reaching quite to the margin, very convex, obtusely rounded in front, widening towards the base; cephalothoracic furrows three on each side, basal one deep, semicircular, curved inwards and backwards, nearly to meet the posterior or neck margin of the glabella, and enclosing a large, semioval, convex tubercle; second furrow short, parallel with the basal one, and producing a much smaller but distinct tubercle at the margin; third or anterior furrow and tubercle on each side, minute, almost obsolete; neck furrow strong; cheeks convex; oculiform tubercle situated about the middle of the cheeks, at the height of the second cephalothoracic tubercle; entire surface strongly but irregularly granulated; largest tubercles on the margin which is separated from the cheeks by a narrow concave smooth space.

This elegant little Trilobite resembles the *O. pygmeum* and *O. elegans* (Münst.), in general appearance, but differs from the first in its greater size, larger eye tubercles, greater width in proportion to the length, and much more obtusely rounded glabella; from the latter it is known by the wide, obtusely rounded front of the glabella, large oculiform tubercles, and fewer cephalothoracic furrows; it is also more strongly granulated than either species. Length of cephalothorax two and a half lines.

Locality.—Not uncommon in the limestone of Chair of Kildare, Kildare, County Kildare.

Harpes Flanagani. *Portk.*

Ref.—Geol. Rep. Pl. 5, figs. 5–7.

Locality.—Common in the schists of Bardahessiagh, Pomeroy, County Tyrone; rare at Carrickadaggan, New Ross, County Wexford.

Harpes(?) megalops. *M'Coy.* (Pl. IV. fig. 5).

Sp. Ch.—Cephalothorax subtrigonal, sides nearly vertical, compressed; glabella very convex, ovate; front rounded, wider than the base, surrounded by a strong defining sulcus; neck furrow very distinct, neck segment narrow, tumid; a large, compressed, oval tubercle on each side the base of the glabella, formed by the retroflexion of the very strong basal cephalothoracic furrows, which are confluent both with the neck furrow, and with that which surrounds the glabella; above which, on each side, is a small, obscurely-marked, second cephalothoracic

furrow, extending on the glabella, arched downwards; cheeks tumid in front of the glabella, where they form a narrow tumid border, widening as they descend into broad, triangular, nearly vertical wings, near the posterior margin of which are situated the unusually large, prominent eyes; at about one-third the length of the glabella, from its upper margin on each side, an obscure impressed line curves gently downwards and outwards to meet the large eye, which is placed lower down than in any other species; (eye-lines?); marginal plate thick, narrow, concave; entire surface of the cephalothorax smooth in the specimens examined.

This singular little Trilobite agrees with *Harpes* in its glabella and cephalothoracic furrows, but differs from all the species of the genus in the position and great size of the external eyes, also in the comparatively small size of the marginal plate; it should, perhaps, form the type of a group intermediate between *Harpes* and *Otarion*. It is allied to the *Otarion pygmeum*, Münst., but has a broader glabella, more widely rounded front; wants the small eye tubercles high upon the cheeks, and has the large ocular protúberance in the posterior part of the cheeks, not possessed by the other. From the sudden bending down of the cheeks from the horizontal front and glabella, to a nearly vertical position, those eyes are rarely seen, except most carefully cleared, and the whole animal generally seems, when in the rock, much narrower than it ought, as shewn in the view of the natural size. Length of cephalothorax three lines, width three and a half lines.

Locality.—Very common in the sandstone of Ardaun, Boocaun, Cappacorcogue and Tonlegee, Cong, County Galway.

Trinucleus Caractaci. *Murch.*

Ref.—Sil. Syst. Pl. 23, fig. 1.

Locality.—Common in the slates at Ballygarvan Bridge, New Ross, County Wexford; very abundant in the schists of Bardahessiagh, Pomeroy, County Tyrone; very common in the slates of Slieve Roe, Rathdrum, County Wicklow; very abundant in the slates of Tirnaskea, Pomeroy, County Tyrone.

Trinucleus elongatus. *Portk.*

Ref.—Geol. Rep. Pl. 1, B., fig. 7.

Locality.—Common in the schists of Bardahessiagh and Tirnaskea, Pomeroy, County Tyrone (probably a mere variety of *T. Caractaci*, from which it cannot be distinguished by any definite characters, the difference in the length of the glabella varying in many specimens, and being very trifling even in the most strongly marked; there is no *structural* difference between the species).

Trinucleus fimbriatus. *Murch.*

Ref.—Sil. Syst. Pl. 23, fig. 2.

Locality.—Common in the slates of Greenville, Enniscorthy, County Wexford; rare in the sandstone of Killey, Pomeroy, County Tyrone; not uncommon in the slates of Slieve Roe, Rathdrum, County Wicklow; common in the schists of Tirnaskea, Pomeroy, County Tyrone.

Trinucleus radiatus. *Murch.*

Ref.—Sil. Syst. Pl. 23, fig. 3.

Locality.—Rare in the slates of Carrickadaggan, New Ross, County Wexford; not uncommon in the slates at Greenville, Enniscorthy, County Wexford; common in the slates of Slieve Roe, Rathdrum, County Wicklow; rare in the schists of Tirnaskea, Pomeroy, County Tyrone.

Trinucleus seticornis. *His.* sp.

Ref.—Portk. Geol. Rep. Pl. 1, fig. 7.—Asaphus seticornis. His. Leth. Suec. Pl. 37, fig. 2.

I have frequently observed the eye-lines, or facial sutures of this species; they pass in a direct line obliquely across the tumid cheeks, through the central tubercle, to the lateral angles of the cephalothorax; it is thus rendered probable that the central puncta of the cheeks of this species may have been true eyes; and those characters, together with the existence of the cephalothoracic furrows, would tend to the generic separation of this species from the typical forms, such as *T. Caractaci.*

Locality.—Common in the slates of Ballygarvan Bridge, New Ross, County Wexford; not uncommon in the sandstone of Killey, Pomeroy, County Tyrone; very common in the slates of Newtown Head, County Waterford; common in the schists of Tirnaskea, Pomeroy, County Tyrone.

Ampyx nasutus. *Dal.*

Ref.—Palæad. Pl. 5, fig. 3.—*A. mammillatus*, Sars. Oken. Isis. 1835. Pl. 8, fig. 5.—*A. Austinii*, Portk. Geol. Rep. Pl. 1, B., figs. 1, 2.

From the very large number of specimens I have examined, I have no doubt of the accuracy of the above synonymes, and the reference of the whole to Dalman's species. The shape of the glabella varies from that of the *A. rostratus*, to an obtusely-rounded, inflated, club-shaped figure; the cephalothoracic furrows also vary a little in strength, &c., but are, on the whole, very characteristic of the species.

Locality.—Not uncommon in the slates of Carrickadaggan, New Ross, County Wexford: not uncommon in the slates of Greenville, Enniscorthy, County Wexford; extremely abundant in the slates north of Newtownhead, County Waterford.

Ampyx rostratus. *Sars.*

Ref.—Oken's Isis. 1835. Pl. 8, fig. 3.—*A. Sarsii*, Portk. Geol. Rep. Pl. 1, figs. 9, 10.

Locality.—Common in the schists of Bardahessiagh and Tirnaskea, Pomeroy, County Tyrone.

Trinodus. *M'Coy. New Genus.*

Gen. Ch.—Cephalic shield truncato-elliptical; glabella convex, nearly cylindrical, sharply defined; cephalothoracic furrows, one on each side, confluent with the neck furrow, and with that defining the glabella, retroflexed to form a small, flattened tubercle on each side of the base of the glabella; neck segment small, narrow; cheeks narrow, convex, surrounding the glabella in front, the portion in front of the glabella as wide as that at the sides; cheeks surrounded by a thick, flattened, entire margin, of equal width all round; eyes none; facial suture (? none); caudal shield equal, and similar in form, to that of the head; axal lobe semi-cylindrical, very convex, divided by three segmental furrows, and having usually a prominent, lengthened tubercle, extending down the middle, and which is not cut by the segmental furrows; lateral lobes almost equal to the axal, very convex, not marked by the segmental furrows; portion encircling the obtuse apex of the axal lobe about equal to that of the sides; surrounded by a flattened margin, less than the side lobes in width.

This genus is allied to *Agnostus* (*Battus*) on the one hand, and to *Trinucleus* and *Harpes* on the other. Count Münster (Beiträge zur Petrefactenkunde, Heft V.) has described some small Trilobites which will fall into this genus, under the head of *Trinucleus*, from which genus they differ in wanting the characteristic sculptured or perforated margin to the shield, and in the truncated posterior margin, the so-called wings not being produced backwards into spines, and in the totally different structure of the pygidium. It much more nearly resembles *Agnostus*, from which it differs, like all other Trilobites, in wanting the transverse division of the glabella characteristic of the genuine *Agnosti*. I am at present acquainted with several species of this genus, both published and unpublished, in all of which the characters above given are constant, the species merely differing from each other in some points of relative proportion. I am as yet unacquainted with the thoracic segments, but suspect that they are not more than two or three in number. The surface is smooth in all the species I am acquainted with.

Trinodus agnostiformis. *M'Coy.* (Pl. IV. fig. 3).

Sp. Ch.—Cephalothorax semioval, length slightly exceeding the width; glabella very convex, narrow, cylindrical, twice as long as wide; sides straight, parallel; front rounded, not reaching within its own diameter of the front margin; cheeks very convex, equal in width to the glabella; limb, or external margin, rather more than half the width of the cheeks, convex, entire; surface smooth, except the external rim, which is faintly marked with radiating striæ.

This curious fossil is most nearly allied to the *Trinucleus lævis*, Münst. (which should also be placed in the present genus), but is distinguished by its narrow, cylindrical glabella, and very convex cheeks. Length of cephalothorax two and a quarter lines; width two lines; length of glabella one and a quarter lines; width one half line.

Locality.—Not uncommon in the slates of Greenville, north of Enniscorthy, County Wexford.

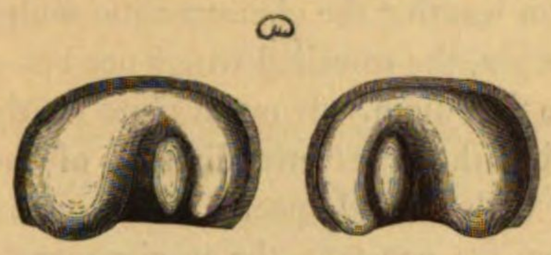
ENTOMOSTRACA.

Beyrichia. *M'Coy. New Genus.*

Sp. Ch.—Shell bivalve, rotundato-quadrate, ventral margin slightly concave, ends very nearly equal, obtusely rounded; sides equal, very gibbous, deeply impressed by a strong and wide sulcus, which extends from the ventral margin nearly to the dorsal, giving a bilobed or reniform appearance to each valve; sulcus slightly nearer to the anterior end; within this sulcus, on each valve, and close to the anterior (or smaller) side, is a lengthened oval tubercle, nearly at right angles with the ventral margin, and reaching about two-thirds the distance from thence to the dorsal margin; surface smooth.

On first examining some specimens from the Irish Silurian sandstones, of what I considered to be the *Agnostus* (*Battus*) *tuberculatus*, Klöd., of the Silurian System, I perceived that the vertical sulcus was very slightly nearer to one end than to the other, and that the lengthened tubercle forming the so-called mesial lobe, was not precisely in the middle, as figured and described by authors; this deviation, though very slight, was important, as shewing that we could not be really looking at the back of a symmetrical animal, as was previously supposed, and that the creature could not be an *Agnostus*. I also perceived that some of the specimens had the tubercle nearest the right, and others nearest the left end, and that, consequently, I had got the two valves of a bivalve entomostacous shell. I therefore doubted the correctness of the reference to the English species, until, on examining the original specimens in London, I found that they, too, were unsymmetrical; I

am now, therefore, certain that my observations apply equally to the Irish fossil and the *Agnostus tuberculatus* of Wales, but should still have doubted the reference to Klöden's Brandenburg species, had not an author well acquainted with the continental fossil, published, a few months ago, a memoir, in which he incidentally alludes to this subject, and expresses an opinion of Klöden's continental fossil similar to that I had already formed of the English and Irish specimens, and which, though I cannot now advance as a discovery, I can yet confirm so far. To give Herr Beyrich full credit for his penetration, I subjoin his remarks (*loc. cit.* p. 47), and have great pleasure in naming the genus after him. "*Battus tuberculatus*, Klöden, welchen Burmeister als synonym zu *Odontopleura ovata* citirt, ist weder ein Battus noch überhaupt ein Trilobit. Er hat ein zweiklappige Schale, deren Oberfläche mit ganz unsymmetrisch geordneten Lappen und Tuberkeln bedeckt ist, und muss eine besondere Gattung neben Cytherina bilden."



The *Agnostus latus* of the American geologists from their "Clinton group," also belongs to this genus. As I am not aware of any figure of our common European species which expresses its characters accurately, I annex a rough sketch of the two valves of the Irish fossil, to illustrate the remarks I have just made. The species I propose naming after its original discoverer.

Beyrichia Klödeni. *M'Coy.*

Syn. Battus tuberculatus. *Klöden. Ref.*—Agnostus tuberculatus. Sow. Sil. Syst. Pl. 3, fig. 17.

Locality.—Common in the sandstone of Boocaun, Cong, County Galway; and in the slates of Cappacorcogue, Cong, County Galway.

Cythere Phaseolus. *His.*

Ref.—Leth. Suec. Pl. 1, fig. 1.

Locality.—Very common in the limestone of Chair of Kildare, Kildare, County Kildare.

ANNELIDA.

Spirorbis Lewisii. *Sow.*

Ref.—Sil. Syst. Pl. 8, fig. 1.

Locality.—Not uncommon, adhering to corals, &c., at Ardaun, Cong, County Galway; occasionally on *Orthoceratites* in the slates of Ferriter's Cove, Dingle, County Kerry; rare in the sandstone of Boocaun, Cong, County Galway; rare in the sandstone of Shanballymore, Cong, County Galway.

INCERTÆ SEDES.

Tentaculites annulatus. *Schloth.*

Ref.—Pet. Pl. 29, fig. 8.

Locality.—Common in the grey calcareous slates of Glengraff and Munterowen, Leenane, County Galway.

TENTACULITES SCALARIS. *Schloth.*

Ref.—Pet. Pl. 20, fig. 9.

Locality.—Common in the sandstone of Boocaun, Cong, County Galway; common in the slates of Cappacorcogue, Cong, County Galway; common in the calcareous slates at Glencraff, Leenane, County Galway; common in the sandstone of Lettershanbally, Maume, County Galway; common in the sandstone of Munterowen, Cong, County Galway; abundant in the slates of Slieve Roe, Rathdrum, County Wicklow; very common in the sandstone of Tonlegee, Cong, County Galway.

ECHINODERMATA.*

ECHINOSPHÆRITES GRANULATUS. *M'Coy.* (Pl. IV. fig. 16).

Sp. Ch.—Spheroidal; ovarian pentagon about one-third longer than wide; mouth conical, of five long plates, narrowing towards their apex, each plate extending the entire length of the projecting mouth; anal opening very small, midway between the mouth and ovarian pentagon, a little on the right side; pedicle of attachment short; surface (when perfect, smooth?) when worn or weathered, divided into numerous polygonal compartments, very irregular in size and shape; granulated by the casts of numerous pores on the inner surface of the plated integument.

This remarkable species is distinguished from all of the genus, by the structure of the proboscis or projecting mouth, being covered in them by numerous very small, polygonal plates, as in the Crinoidea, while, in the present creature, it is formed but of one series of five lengthened plates, extending from the base to the apex, precisely as in Bronn's figure of the *Sycocystites*, V. Buch., *Senkenbergii*, V. Meyer., SP. The ovarian pentagon is also longer, in proportion to its width, than in the other species of *Echinosphærites* and *Caryocystites*. Like the *E. pomum*, Gyll., SP., the pores (if they existed on the surface) must have penetrated the thickness of the plated integument, and their casts are always preserved as a granulation on the weathered

* Although, in deference to Baron Von Buch and other Palæontologists, I have arranged *Echinosphærites* under the *Echinodermata*, yet it may not be amiss to state, that my own impression of its affinities approximates more to Mr. König's original view (*loc. cit.*). I would, however, differ as to the genus and recent form, to which I should refer for a close comparison of characters, as I conceive that it is to Mr. Broderip's genus *Chelyosoma* (see Zool. Jour. vol. v.) that the *Echinosphærites* are most allied. This remarkable animal is almost generically identical with the fossil before us; it is a tunicate mollusc, enclosed in a tough coriaceous cup; the upper surface covered with distinct, horny, polygonal plates; the lower leathery portion also shewing a tendency to assume an imperfect, or irregular plated structure; the upper surface exhibits also two conical valvular openings, perfectly corresponding with the oral and ovarian openings which I have figured in the *E. granulatus*, except that they are composed of six plates each in the recent animal, and of only five in the fossil. It seems to me that the irregular division of the integument which I have observed constantly, and figured in the *E. granulatus*, indicates a coriaceous, imperfectly divided covering, like that of *Chelyosoma*, rather than the definitely angular, regular, plating of the crust of the *Echinodermata*. The recent animal alluded to adheres to stones, &c., by short processes of integument, like the pedicles of the *Echinosphærites*. It will be observed that the species I have above described approaches much more nearly to the type I have alluded to, and departs more from the echinodermatous types, than any of the species previously known.

specimens; but I have not observed any trace on the outer surface of the plates, which, when preserved, seem smooth, so that they may have been confined to the inner surface. In general, the granulation, in this species, has no definite order; more rarely an approach to the star-like disposition figured by Von Buch, in the *Caryocystites testudinarius* is visible. The granulation of the casts, together with the proportionably small size and very irregular form of the plating, will help to distinguish fragments of this species.

Locality.—Extremely common, and gregarious, in the slates and grits at Carrickadaggan, New Ross, County Wexford.

ZOOPHYTA.

Petraïa bina. *Lonsd.*

Ref.—Turbinolopsis bina. Sil. Syst. Pl. 16, bis., fig. 5.

Locality.—Common in the calcareous slates of Ardaun, Cong, County Galway; in the sandstone of Boocaun, Cong, County Galway; common in the green slates of Doonquin, Dingle, County Kerry; common in the limestone and slates of Egool, Ballaghaderreen, County Mayo; common in the green slates of Ferriter's Cove, Dingle, County Kerry; in the slates of Foylathurrig, Dingle, County Kerry; in the grey calcareous slate of Kilbride, Cong, County Galway; in the dark grey schists of Tullyconnor, Leenane, County Galway.

Petraïa quadrata. *M'Coy.* (Pl. IV. fig. 18).

Sp. Ch.—Obliquely pyramidal, shorter than the smallest diameter of the cup, quadrangular; the four sides flat, defined by distinct angular ridges, from the apex to the base; with three nearly equal sides, and one, towards which the apex inclines, about one-third less than the others; surface externally marked with concentric ridges of growth, and faint, longitudinal striæ, corresponding with the internal lamellæ; internal lamellæ about one hundred and four at the margin.

This singular coral is perfectly constant in shape, and there can be no doubt of the quadrangular form of the species, by which it is easily distinguished from any other described coral, except the *Turbinolia pyramidalis*, His., which, however, seems much longer, in proportion to the width of the cup, besides being more irregularly formed, and having a smooth surface. The four flat sides are strongly defined by four rounded ridges, which are distinct from the apex to the base; the apex is so much inclined as to hang directly over the margin of the shorter side of the base, when reversed. Long diameter of base nine lines; short diameter of base seven lines; height of apex five lines.

Locality.—Common in the slates of Ardaun and Kilbride, Cong, County Galway.

Petraïa ziczac. *M'Coy.* (Pl. IV. fig. 17).

Sp. Ch.—(Cast of cup) obtusely conical, short; principal lamellæ thirty-four; all reaching the centre; between each pair of those are a like number of secondary plates, which only reach half way to the centre; all those plates are strongly and regularly furrowed on the sides, so that on the surface of the casts they seem regularly sculptured in a close, sharp, zig-zag manner.

This extremely beautiful species is easily known by its curiously marked surface, all the plates seeming

indented in the most regular zig-zag manner, the projecting angles of one alternating with those of the next; the base is generally elliptical. Long diameter of base nine lines; short diameter seven lines; height of cast three and a half lines.

Locality.—Not uncommon in the calcareous slates of Ardaun, Cong, County Galway.

Cyathophyllum cæspitosum. *Gold.*

Ref.—Pet. Germ. Pl. 20, fig. 2.

Locality.—In the calcareous slates of Ardaun, Cong, County Galway; common in the limestone of Chair of Kildare, Kildare, County Kildare; common in the green slates of Doonquin, Dingle, County Kerry; in the dark limestone of Portrane, Malahide, County Dublin.

Cyathophyllum dianthus. *Gold.*

Ref.—Pet. Germ. Pl. 15, fig. 13.

Locality.—Common in the limestone of Portrane, Malahide, County Dublin.

Cyathophyllum flexuosum. *Gold.*

Ref.—Pet. Germ. Pl. 17, fig. 3.

Locality.—Rare in the impure limestone of Egool, Ballaghaderreen, County Mayo.

Cyathophyllum turbinatum. *Gold.*

Ref.—Pet. Germ. Pl. 16, fig. 8.

Locality.—In the calcareous slates of Ardaun, Cong, County Galway; in the limestone of Chair of Kildare, Kildare, County Kildare; in the impure limestone of Egool, Ballaghaderreen, County Mayo; in the calcareous slate of Kilbride, Cong, County Galway; in the limestone of Portrane, Malahide, County Dublin.

Strombodes plicatus. *Gold.* sp.

Ref.—Pet. Germ. Pl. 8, fig. 5.

Locality.—Rare in the green slates of Doonquin, Dingle, County Kerry.

Caryophyllia flexuosa. *Lam.*

Ref.—Sil. Syst. Pl. 16, fig. 7.

Locality.—Rare in the slates of Ferriter's Cove, Dingle, County Kerry.

Cladocora sulcata. *Lonsd.*(?)

Ref.—Sil. Syst. Pl. 16, bis, fig. 9.

Locality.—Very rare in the slates of Ferriter's Cove, Dingle, County Kerry.

CYSTIPHYLLUM CYLINDRICUM. *Lonsd.*

Ref.—Sil. Syst. Pl. 16, bis, fig. 3.

Locality.—Not uncommon in the calcareous slates of Ardaun, Cong, County Galway.

CYSTIPHYLLUM SILURIENSE. *Lonsd.*

Ref.—Sil. Syst. Pl. 16, bis, fig. 1.

Locality.—In the calcareous slates of Ardaun, Cong, County Galway.

MONTICULARIA CONFERTA. *Lonsd.*

Ref.—Sil. Syst. Pl. 16, fig. 5.

Locality.—Rare in the calcareous slates of Ardaun, Cong, County Galway.

ACERVULARIA BALTICA. *Schweig.*

Ref.—Sil. Syst. Pl. 16, fig. 8.

Locality.—Not uncommon in the impure limestone of Egool, Ballaghaderreen, County Mayo.

PORITES INORDINATA. *Lonsd.*

Ref.—Sil. Syst. Pl. 16, bis, fig. 12.

Locality.—Abundant in the green slates of Ferriter's Cove, Dingle, County Kerry; common in the slate of Doonquin, Dingle, County Kerry.

PORITES MEGASTOMA. *M'Coy.* (Pl. IV. fig. 19).

Sp. Ch.—Forming large, hemispherical, or irregular masses; base concentrically rugose; composed of stellular twelve-rayed tubes, one line in diameter, placed usually about half their diameter apart; interstices of numerous polygonal tubes, about three in the shortest line between one stellular tube and the next.

This species is distinguished from the *P. pyriformis* by the great size of the stellular tubes, and the smaller number of intervening polygonal ones.

Locality.—Forms masses, five inches in diameter, in the impure calcareous strata of Egool, Ballaghaderreen, County Mayo, where it is common; I have also seen it from the Eifel, in company with the small, distant-tubed kind, such as that figured by Mr. Lonsdale, in the Silurian Researches, and by Bronn, as the true *P. pyriformis.*

PORITES PETALLIFORMIS. *Lonsd.*

Ref.—Sil. Syst. Pl. 16, fig. 4.

Locality.—Abundant and of large size in the impure limestone of Egool, Ballaghaderreen, County Mayo.

PORITES PYRIFORMIS. *Ehren.*

Ref.—Sil. Syst. Pl. 16, fig. 2.

Locality.—In the grey slates of Coolin, Cong, County Galway; in the slates of Doonquin, Dingle, County Kerry; abundant in the calcareous strata at Egool, Ballaghaderreen, County Mayo; in the slates of Ferriter's Cove, Dingle, County Kerry; in the limestone of Portrane, Malahide, County Dublin.

FAVOSITES ALVEOLARIS. *Blainv.*

Ref.—Gold. Pet. Germ. Pl. 26, fig. 1.—Sil. Syst. Pl. 15, figs. 1, 2.

Locality.—In the calcareous slates of Ardaun and Cappacorcogue, Cong, County Galway; in the slates of Foylathurrig, Dingle, County Kerry; abundant in the limestone of Portrane, Malahide, County Dublin.

FAVOSITES FIBROSA. *Gold.*

Ref.—Sil. Syst. Pl. 15, bis, fig. 6.

Locality.—Common in the slates of Ardaun, Cong, County Galway; common in the slates of Ballyaglish, County Kerry; in the slates of Ballygarvan Bridge and Carrickadaggan, New Ross, County Wexford; common, both in the limestone and shale of Chair of Kildare, Kildare, County Kildare; common in the slates of Doonquin, Dingle, County Kerry; common in the slates of Duffcarrick, Gorey, County Wexford; abundant in the limestone and slates of Egool, Ballaghaderreen, County Mayo; common in the slates of Ferriter's Cove, Dingle, County Kerry; common in the slates of Greenville, Enniscorthy, County Wexford; common in the slates of Kildermot, Gorey, County Wexford; common in the sandstone of Killey, Pomeroy, County Tyrone; in the schists of Knockmahon, Tramore, County Waterford; common in the grey calcareous sandstone of Munterowen, Leenane, County Galway; common in the slates of Slieve Roe, Rathdrum, County Wicklow; in the slates of Tieravane, Dingle, County Kerry.

FAVOSITES GOTHLANDICA. *Lam.*

Ref.—Sil. Syst. Pl. 15, bis. figs. 3, 4.

Locality.—Common in the grey slates of Ardaun, Cong, County Galway; abundant in the impure lime stone of Egool, Ballaghaderreen, County Mayo; in the grey calcareous slate of Kilbride, Cong, County Galway.

FAVOSITES MULTIPORATA. *Lonsd.*

Ref.—Sil. Syst. Pl. 15, bis, fig. 5.

Locality.—Very common in the calcareous slates of Ardaun, Cong, County Galway; common in the slates of Ballyaglish, County Kerry; common in the grey slates of Coolin, Cong, County Galway; in the slates of Doonquin, Dingle, County Kerry; in the slates of Ferriter's Cove and Foylathurrig, Dingle, County Kerry; in the grey slates of Kilbride, Cong, County Galway.

Favosites Petropolitana. *Pand.*(?). (var. Lycopodites. *Emm.*). Pl. IV. fig. 21.

Ref.—Favosites lycopodites. Emmons, Geol. New York, P. 389, fig. 3.

It is with much doubt I should refer this interesting fossil to the Russian species, as that seems, according to Pander, to vary considerably in form, while the present species, which occurs in extraordinary abundance on the Waterford coast, is almost perfectly constant. In the very large number of examples which I have seen, varying in size from a hazel nut to three inches in diameter, there has been no greater difference in form than the base of some being slightly more elliptical than others, and an occasional trifling variation in the height. On the other hand, there can be no hesitation in uniting it with the American species, with which it is perfectly identical; and I would have adopted Emmons' name definitively, but from a doubt whether that species, also, may be referrible to a variety of the *F. Petropolitana.* I have, therefore, left the question an open one, not being in possession of data for deciding it, and have given a figure of the Irish coral for comparison. The upper surface is uniformly reticulated by the openings of small polygonal tubes, about five occupying the space of one line.

Locality.—Common in the slates of Glounmore, west of Ventry Harbour, County Kerry; extremely abundant in the schists of Knockmahon, Tramore, and Ballydowan Bay, County Waterford.

Favosites polymorpha. *Gold.*

Ref.—Pet. Germ. Pl. 27, fig. 4. Sil. Syst. Pl. 15. fig. 2.

Locality.—Common in the grey slate of Coolin, Cong, County Galway; common in the slates of Doonquin, Dingle, County Kerry; common in the impure limestone of Egool, Ballaghaderreen, County Mayo; common in the slates of Ferriter's Cove, Dingle, County Kerry; in the slates of Kilbride, Cong, County Galway; in the limestone of Portrane, Malahide, County Dublin.

Favosites spongites. *Gold.*

Ref.—Sil. Syst. Pl. 15, fig. 8.

Locality.—Rare in the slates of Doonquin, Dingle, County Kerry; in the limestone of Egool, Ballaghaderreen, County Mayo; in the slates of Ferriter's Cove, Dingle, County Kerry; in the limestone of Riverchapel, Gorey, County Wexford.

Stromatopora concentrica. *Gold.*

Ref.—Sil. Syst. Pl. 15, fig. 31.

Locality.—Common in the slates of Doonquin, Dingle, County Kerry; common in the impure limestone of Egool, Ballaghaderreen, County Mayo; common in the slates of Ferriter's Cove, Dingle, County Kerry.

Stromatopora polymorpha. *Gold.*

Ref.—Pet. Germ. Pl. 64, fig. 8.

Locality.—Rare in the limestone of Chair of Kildare, Kildare, County Kildare.

PTILODICTYA DICHOTOMA. *Portk.*

Ref.—Geol. Rep. Pl. 21, fig. 3.

Locality.—In the calcareous slates of Ardaun, Cong, County Galway; common in the limestone of Chair of Kildare, Kildare, County Kildare; in the grey calcareous slate of Glencraff, Leenane, County Galway.

HALYSITES CATENULATUS. *Linn.* SP.

Syn.—Catenipora escharoides. *Lam.* *Ref.*—Sil. Syst. Pl. 15, bis, fig. 14.

Locality.—Common in the grey slate of Ardaun and Cappacorcogue, Cong, County Galway; in the limestone of Chair of Kildare, Kildare, County Kildare; in the slate of Coolin, Cong, County Galway; common in the slate of Doonquin, Dingle, County Kerry; common, of large size, in the limestone of Egool, Ballaghaderreen, County Mayo; common in the slates of Ferriter's Cove, Dingle, County Kerry; in the slates of Kilbride, Cong, County Galway; common in the schists of Pomeroy, County Tyrone; common in the limestone of Portrane, Malahide, County Dublin; in the schists of Tirnaskea, Pomeroy, County Tyrone; in the blackish schists of Tullyconnor, Leenane, County Galway.

SYRINGOPORA (HARMODITES) LONSDALEIANA. *M'Coy.* (Pl. IV. fig. 20).

Sp. Ch.—Tubes thick (one line in diameter), slightly flexuous aggregated, very seldom branching; connecting tubuli extremely few, and irregular in distance.

Mr. Lonsdale has given a good figure of this species, under the head of *Syringopora reticulata*, Gold., in Mr. Murchison's Silurian Researches. That species, however, which is abundant in the carboniferous limestone, has the tubes scarcely half the diameter of the present coral, much more flexuous, and with very numerous and regular connecting tubuli; this species is much more allied to the carboniferous *S. ramulosa*, Gold., from which it is distinct by the closer and more regular tubes, and few (almost no) connecting tubuli.

Locality.—Forms large masses in the limestone of Portrane, Malahide, County Dublin.

AULOPORA SERPENS. *Gold.*

Ref.—Pet. Germ. Pl. 29, fig. 1.

Locality.—Rare in the slates of Doonquin and Ferriter's Cove, Dingle, County Kerry.

FENESTELLA ANTIQUA. *Lonsd.*

Ref.—Sil. Syst. Pl. 15, fig. 16.

Locality.—Rare in the slates of Doonquin and Ferriter's Cove, Dingle, County Kerry.

FENESTELLA MILLERI. *Lonsd.*

Ref.—Sil. Syst. Pl. 15, fig. 17.

Locality.—Rare in the slates of Slieve Roe, Rathdrum, County Wicklow.

FENESTELLA RETICULATA. *Lonsd.*

Ref.—Sil. Syst. Pl. 15, fig. 19.

Locality.—Rare in the slates of Slieve Roe, Rathdrum, County Wicklow.

GORGONIA ASSIMILIS. *Lonsd.*

Ref.—Sil. Syst. Pl. 15, fig. 27.

Locality.—Rare in the limestone of Chair of Kildare, Kildare, County Kildare.

GORGONIA REGULARIS. *Portk.*

Ref.—Geol. Rep. Pl. 20, fig. 6.

Locality.—Rare in the limestone of Chair of Kildare, Kildare, County Kildare; rare in the sandstone of Killey, Pomeroy, County Tyrone; rare in the schists of Tirnaskea, Pomeroy, County Tyrone.

GRAPTOLITES(*a*) DISTANS. *Portk.*

Ref.—Geol. Rep. Pl. 19, fig. 4.

Locality.—Not uncommon in the black slate of Limehill, Pomeroy, County Tyrone.

GRAPTOLITES FOLIUM. VAR. *His.* SP.

Ref.—Leth. Suec. Pl. 35, fig. 8.—*G. foliaceus.* Murch. Sil. Syst. Pl. 26, fig. 3.

Locality.—Common in the black slate at Arklow Rock, Arklow, County Wicklow; not uncommon in the black slate of Limehill, Pomeroy, County Tyrone.

GRAPTOLITES PRISTIS. *His.* SP.

Ref.—Leth. Suec. Pl. 35, fig. 5.

Locality.—Common in the black slate at Arklow Rock, Arklow, County Wicklow; common in the black slate of Ballinatray Bridge, Gorey, County Wexford; abundant in the black slate of Commons of Slane, Slane, County Meath; common in the black slate of Lisbellaw, County Fermanagh; in the black slate of Tinnaglough, New Ross, County Wexford.

GRAPTOLITES SAGITTARIUS. *His.* SP.

Ref.—Leth. Suec. Pl. 35, fig. 6.

Locality.—Common in the black slate of Limehill, Pomeroy, County Tyrone; common in the black slate of Lisbellaw, County Fermanagh.

(*a*) I have adopted M. de Vernueil's termination for this word, as more simple and elegant than that in general use.

GRAPTOLITES SEDGWICKII. *Portk.*

Ref.—Geol. Rep. Pl. 19, fig. 1.

Locality.—Very common in the black slate of Limehill, Pomeroy, County Tyrone.

GRAPTOLITES TENUIS. *Portk.*

Ref.—Geol. Rep. Pl. 19, fig. 7,

Locality.—Common in the black slate of Limehill, Pomeroy, County Tyrone.

AMORPHOZOA.

A very remarkable fossil, which I refer, with some doubt, to this group, is in the collection of Mr. Griffith, from the sandstone near Cong, County Galway. The specimen is a lengthened oval mass, about two inches long, and three-fourths of an inch wide, of crowded spicula, varying in length from two lines to more than half an inch. The spicula resemble the letter X in shape, four of the rays being always very distinct, and disposed in that form; but there also seems to have certainly been one similar ray extending upwards, and another downwards, from the centre, considering the other four to be horizontal; the rays are round, tapering, pointed, smooth, and apparently hollow. They remind us much of *Xanthidium* and those allied forms, but have obviously a stronger affinity with the group in which I have placed them, although I do not think I have seen, even among any of the foreign sponges, such strong, star-like spicula. Should naturalists, however, agree in the view I have taken of this body, the generic name *Acanthaspongia*(*a*) might be proposed for it, from its remarkably developed spicula. The species might stand as *Acanthaspongia Siluriensis.*

(*a*) From ἀκανθώδης, full of prickles or spines.

ADDENDA.

Helminthochiton. *Salter.*

Gen. Ch.—Elongate, plates as long or longer than wide; the apex of the anal plate remote from its front edge; apophyses widely separated; the plates only a little covered on their forward edge by the mantle which is smooth, thin, and extending far beyond the shell in the recent (tropical?) species.

This genus, or subgenus, of the Chitonidæ, has been proposed for the palæozoic form of *Chiton*, which is greatly elongated beyond the common type, and its lateral areæ obscurely marked. The recent species, *C. incisus* and *C. alatus* of the Philippines, are regarded as living forms of the genus; but it may be found hereafter necessary to isolate the fossil species, and it is to them only the name is intended to apply.

The group contains two or three natural sections; one (of which *C. priscus* is the type), with the plates of a square form, the apophyses moderate, and the surface smooth; another, with rhomboidal, granulated plates, and large apophyses, *C. eburonicus*, De Ryckh., is a good example; and the Silurian fossil described below probably forms a third, distinguished by peculiar characters, and having its nearest living ally in *C. alatus*, Sow.

Helminthochiton Griffithii. *Salter.* (Pl. V. fig. 5.)

H. Griffithii. Geol. Journ. Aug. 1846.

Sp. Ch.—Linear-oblong, smooth, carinate; plates bent at a low angle, thin, deeply emarginate behind; no distinct lateral area; cephalic plate half oval, longer than wide, marked with four or five faint radiations, and a few lines of growth.

A thin shell, that must have been about two inches long when perfect. Notwithstanding some peculiarities this curious fossil is referred, after careful consideration, to the *Chitonidæ*. It is, as far as we know, the earliest of the family, and we may expect to trace this peculiar form through the secondary rocks, from which, at present, none have been published. About twenty-two fossil species are known.

Locality.—Coolin, Galway (in flaggy mudstone).

Pleurorhynchus pristis. *Salter.* (Pl. V. fig. 4.)

Sp. Ch.—Valves, when united, not quite so deep as long; anterior side flat, covered by close, regular lines of growth; lunette extending half-way down the wing, sharply sunk, with about seven or eight ribs; beak or spine?

This very natural genus, indicated, but not defined, by Professor Phillips, has hitherto been described only from the Carboniferous and Devonian systems, from *C. Lyellii De Vern.*, a fossil from *Villmar ;* our shell differs in the greater proportion of the ribbed (not smooth) lunette to the flat wing.

Locality.—Cappacorcogue, Cong, County Galway.

Orthis fallax. *Salter.* sp. nov. (Pl. V. fig. 3.)

Sp. Ch.—Shell thin, transversely oval, ribbed, with a raised front ; ribs simple, straight, numerous, regularly increasing in number to the margin; hinge area as wide as the shell, moderately broad; dorsal valve (*Owen*) convex, with a narrow raised middle ; its cardinal teeth small, parallel; the central projection sharp at the beak, and continued as a rib half down the shell; ventral valve (*Owen*) convex at the beak, depressed in the middle, its cardinal teeth rather small, converging behind at the upper third, a slight projection between them.

It is necessary, now that the genus is so rich in species, to describe minutely the teeth and internal plates, and Murchison's and De Verneuil's beautiful figures leave us hardly anything to wish for on this head. In England, on the contrary, our lower Silurian fossils are almost always casts, and we must recognize the internal structure from them ; it may with care be always done, and, in the present instance, we have little else to guide us. It appears, however, to be quite distinct from any published in Britain or abroad, as far as I know them.

Locality.—Killey in Pomeroy.

The peculiar character of the raised front resembles Spirifer rather than Orthis, and will render this and the following species more easy to recognize ; the interior is that of Orthis.

Orthis reversa. *Salter.* sp. nov. (Pl. V. fig. 2.)

Sp. Ch.—Round when young, more transverse when old, convex, evenly striated; striæ direct, equal, interlined towards the margin; hinge area short and narrow; dorsal (*Owen*) valve evenly convex, the front edge raised, the cardinal teeth strong, divergent, the central plate sharp and short at the beak, central rib faint; ventral valve convex, sunk at the margin, cardinal teeth strong, extending nearly half down the shell; central rib strong only at the end of the muscular impressions.

The present shell is described from abundant internal and external casts in the sandstone of Galway, and these are quite as satisfactory as perfect shells. There are species much resembling this in Ayrshire in similar strata.

Orthis (?) applanata. *Salter.* sp. nov. (Pl. V. fig. 1.)

Sp. Ch.—Semicircular, with projecting ears, flat, radiated with about twenty-two thin, prominent ribs, which have a smaller one between each pair ; strong, distant lines of growth, arched inwards as the shell grows old; cardinal teeth small, and diverging at right angles in each valve, no central plate in the hinge of the dorsal one, which has a shallow furrow down the middle.

This pretty shell differs from any like it in its distant, prominent, thread-like ribs, without intermediate striæ, and strong, concentric lines of growth. In some adult specimens the ribs project like those of *Verticordia*, and produce a pectinate margin. It never seems to attain more than three-qurrters of an inch in breadth.

Locality.—Abundant in slabs at Coolin, Cong, in company with *O. corrugata*, Portk.

EXPLANATION OF THE PLATES.

NOTE.—I have been requested by the lithographic printer to state, that from the plates having been lithographed nearly a year before they were printed, the finer shades and touches have become effaced through absorption, and not through any negligence on his part. I may also mention, that, from unavoidable circumstances, my drawings could not on this occasion be lithographed under my own eye; and some of the lithographs are, in consequence, deficient in neatness of expression of the peculiar characters: where this, however, would lead to error, I have noticed it in the following explanations of the figures.

F.M'C.

EXPLANATION OF PLATE I.

Fig. 1.—ACANTHALEPIS JAMESII. *M'Coy.* (Page 7).
Magnified scale, having five ridges ; three of the compartments being granulated, and two striated. The line indicates the natural size.

Fig. 2.—ACANTHALEPIS JAMESII. *M'Coy.* (Page 7).
Scale natural size, having but four ridges, two compartments granulated, and two striated.

Fig. 3.—ORTHOCERAS CORALLIFORME. *M'Coy.* (Page 8).
Right hand figure natural size; left hand figure, magnified portion of external surface.

Fig. 4.—ORTHOCERAS SUBGREGARIUM. *M'Coy.* (Page 9).

Fig. 5.—POTERIOCERAS APPROXIMATUM. *M'Coy.* (Page 10).

Fig. 6.—TURRITELLA PLANA. *M'Coy.* (Page 12).

Fig. 7.—TURBO CONCINNUS. *M'Coy.* (Page 12).

Fig. 8.—TURBO TRITORQUATUS. *M'Coy.* (Page 12).

Fig. 9.—TURBO TROCHLEATUS. *M'Coy.* (Page 12.)

Fig. 10.—NATICOPSIS CONCINNA. *M'Coy.* (Page 13).

Fig. 11.—EUOMPHALUS FURCATUS. *M'Coy.* (Page 13).
Magnified; line natural size.

Fig. 12.—EUOMPHALUS LAUTUS. *M'Coy.* (Page 14).
Figured from a cast in a slightly crushed cavity. It is of the variety wanting the intermediate small spiral ridges.

Fig. 13.—EUOMPHALUS TRICINCTUS. *M'Coy.* (Page 14).

Fig. 14.—TROCHUS MULTITORQUATUS. *M'Coy.* (Page 15).

Fig. 15.—PLEUROTOMARIA INFLATA. *M'Coy.* (Page 15).

Fig. 16.—PLEUROTOMARIA LATIFASCIATA. *M'Coy.* (Page 15).

Fig. 17.—MURCHISONIA BICINCTA. *M'Coy.* (Page 16).
Magnified; line natural size.

Fig. 18.—MURCHISONIA CINGULATA. *His. Var.* (Page 16).

Fig. 19.—MURCHISONIA PULCHRA. *M'Coy.* (Page 16).
Right hand figure natural size; left hand figure, body whorl magnified.

Fig. 20.—MURCHISONIA SULCATA. *M'Coy.* (Page 17).

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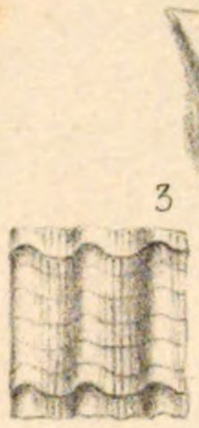

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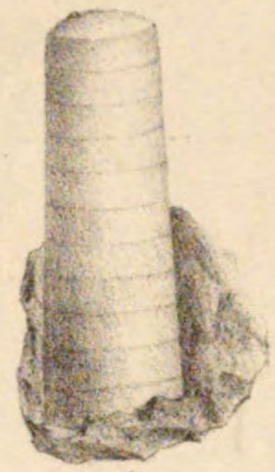

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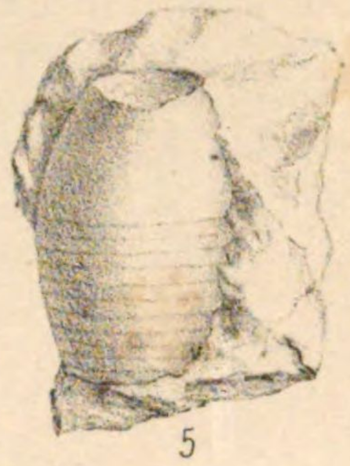

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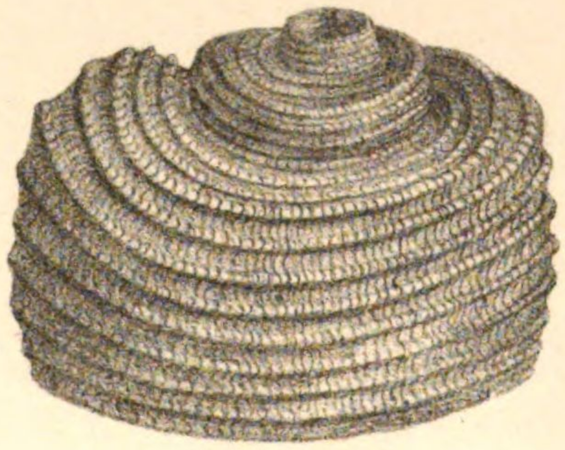

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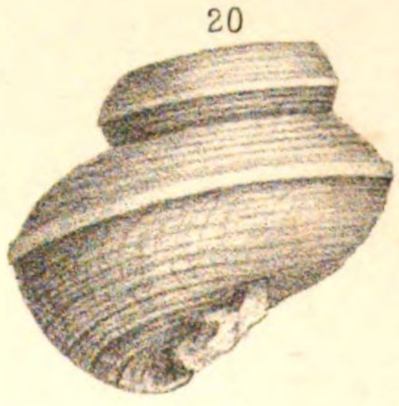

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EXPLANATION OF PLATE II.

Fig. 1.—LUCINA BULLA. *M'Coy.* (Page 17).
Internal cast, natural size, shewing the impressions of the teeth, adductors, and mantle.

Fig. 2.—PULLASTRA SPECIOSA. *M'Coy.* (Page 17).
Upper figure natural size; lower figure, portion of surface magnified.

Fig. 3.—NUCULA SUBACUTA. *M'Coy.* (Page 19).
Magnified figure ; the line indicates the natural size.

Fig. 4.—NUCULA SUBCYLINDRICA. *M'Coy.* (Page 19).
Left hand figure, external surface, natural size; right hand lower figure, internal cast, natural size; upper figure, teeth and subrostral plate slightly magnified.

Fig. 5.—ARCA QUADRATA. *M'Coy.* (Page 20).
Lower figure natural size; upper figure, magnified view of hinge teeth.

Fig. 6.—ARCA SCITULA. *M'Coy.* (Page 20).
Left hand figure, magnified view of portion of surface; right hand figure, natural size.

Fig. 7.—PTERINEA FIMBRIATA. *M'Coy.* (Page 21).

Fig. 8.—PTERINEA ORBICULARIS. *M'Coy.* (Page 21).
Small specimen of the semiradiated valve, natural size.

Fig. 9.—PTERINEA(?) PANOPÆAFORMIS. *M'Coy.* (Page 22).
Internal cast, with impressions of the teeth.

Fig. 10.—PTERINEA(?) POSIDONIAFORMIS. *M'Coy.* (Page 22).

Fig. 11.—PTERINEA SQUAMOSA. *M'Coy.* (Page 22).

Fig. 12.—PTERINEA SUBLÆVIS. *M'Coy.* (Page 23).
Upper figure, small specimen, external surface ; lower figure, larger specimens of internal casts of the right and left valves, shewing the impressions of the cardinal teeth: all the figures of the natural size.

Fig. 13.—AVICULA BULLATA. *M'Coy.* (Page 23).

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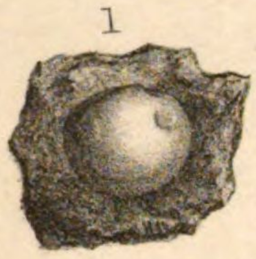

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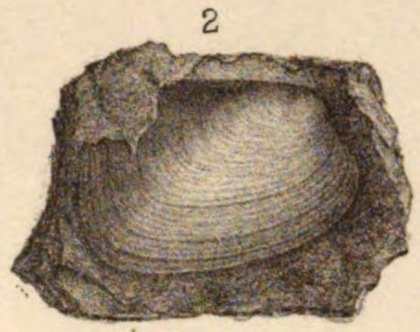

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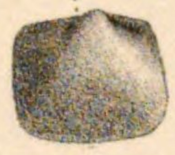

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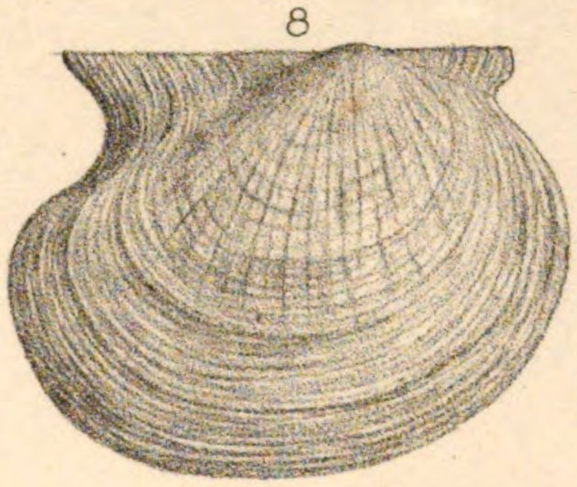

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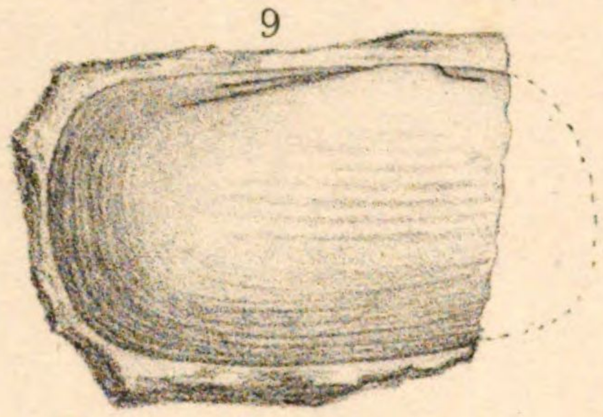

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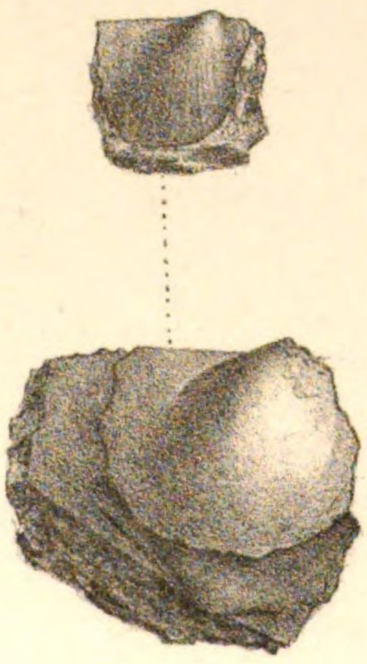

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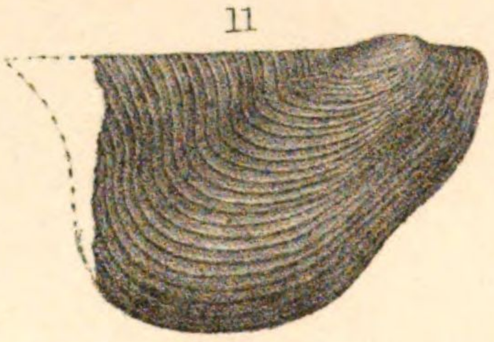

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EXPLANATION OF PLATE III.

Fig. 1.—LINGULA OVATA. *M'Coy.* (Page 24).

Fig. 2.—ORBICULA PERRUGATA. *M'Coy.* (Page 24).

Fig. 3.—PRODUCTA MONILIFERA. *M'Coy.* (Page 25).
Figure highly magnified; the line denotes the natural size.

Fig. 4.—PRODUCTA TENUICINCTA. *M'Coy.* (Page 25).
Left hand figure natural size; right hand figure, magnified view of transverse striæ.

Fig. 5.—LEPTAGONIA PLICOTIS. *M'Coy.* (Page 25).

Fig. 6.—LEPTAGONIA SEMIOVALIS. *M'Coy.* (Page 26).

Fig. 7.—LEPTÆNA LÆVISSIMA. *M'Coy.* (Page 27).
Magnified figure; the line of the natural size.

Fig. 8.—ORTHIS QUINQUECOSTATA. *M'Coy.* (Page 33).

Fig. 9.—ORTHIS CALCARATA. *M'Coy.* (Page 28).

Fig. 10.—ORTHIS CRISPA. *M'Coy.* (Page 29).
In the magnified view the transverse striæ not sufficiently sharp or scale-like.

Fig. 11.—ORTHIS FUNICULATA. *M'Coy.* (Page 30).

Fig. 12.—ORTHIS GALEA. *M'Coy.* (Page 30).

Fig. 13.—ORTHIS INTERPLICATA. *M'Coy.* (Page 31).

Fig. 14.—ORTHIS PORCATA. *M'Coy.* (Page 32).

Fig. 15.—ORTHIS PRODUCTOIDES. *M'Coy.* (Page 32).
Several views, natural size, and magnified view of striæ.

Fig. 16.—ORTHIS PSEUDOPECTEN. *M'Coy.* (Page 33).
Striæ in the magnified view too nearly equal. See description.

Fig. 17.—ORTHIS SARMENTOSA. *M'Coy.* (Page 34).

Fig. 18.—ORTHIS SIMPLEX. *M'Coy.* (Page 34).

Fig. 19.—ORTHIS SUBLÆVIS. *M'Coy.* (Page 35).

Fig. 20.—ORTHIS TENUISSIMESTRIATA. *M'Coy.* (Page 35).

Fig. 21.—ORTHIS UNDATA. *M'Coy.* (Page 36).

Fig. 22.—ORTHIS UNDULATA. *M'Coy.* (Page 36).

Fig. 23.—SPIRIFER BIGUGOSUS. *M'Coy.* (Page 36).
Lower figure, cardinal area.

Fig. 24.—SPIRIFER OVATUS. *M'Coy.* (Page 37).

Fig. 25.—SPIRIFER LYNX. *Eichw.* VAR. (Page 37).

Fig. 26.—SPIRIFER TEREBRATULIFORMIS. *M'Coy.* (Page 38).

Fig. 37.—SPIRIFER TRIDENS. *M'Coy.* (Page 38).

Fig. 28.—ATRYPA FILOSA. *M'Coy.* (Page 39).
The longitudinal striæ nearly effaced in the figure.

Fig. 29.—ATRYPA SERRATA. *M'Coy.* (Page 41).

Fig. 30.—ATRYPA SEXCOSTATA. *M'Coy.* (Page 41).

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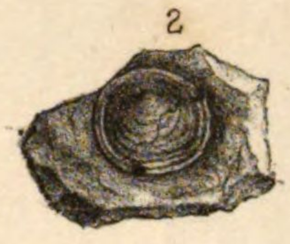
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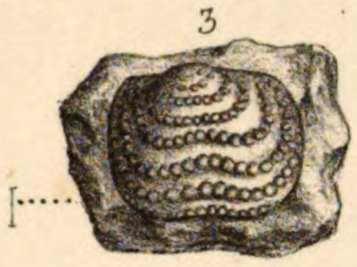
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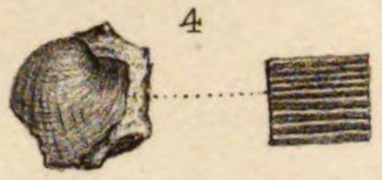
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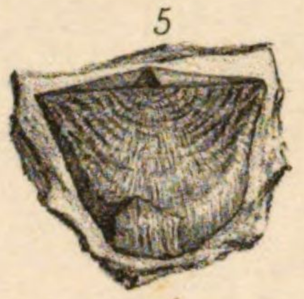
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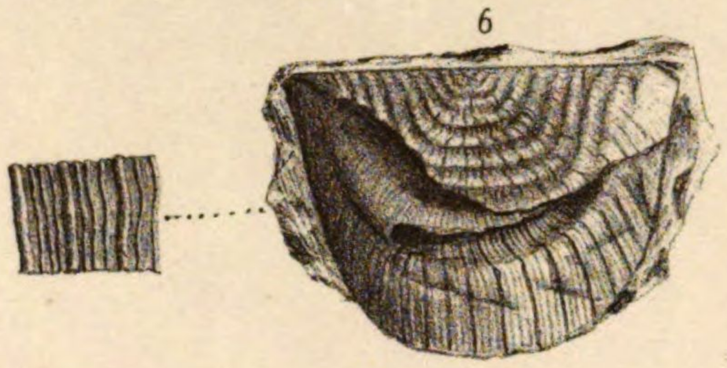
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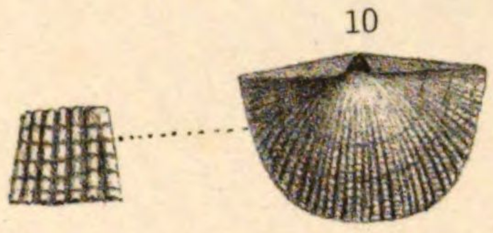
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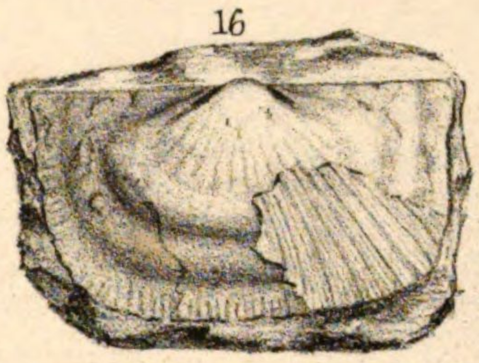
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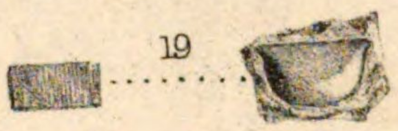
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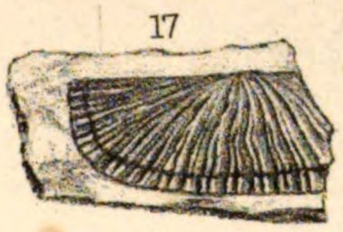
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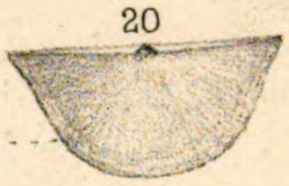
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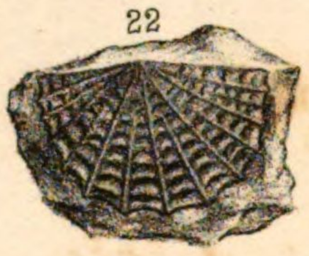
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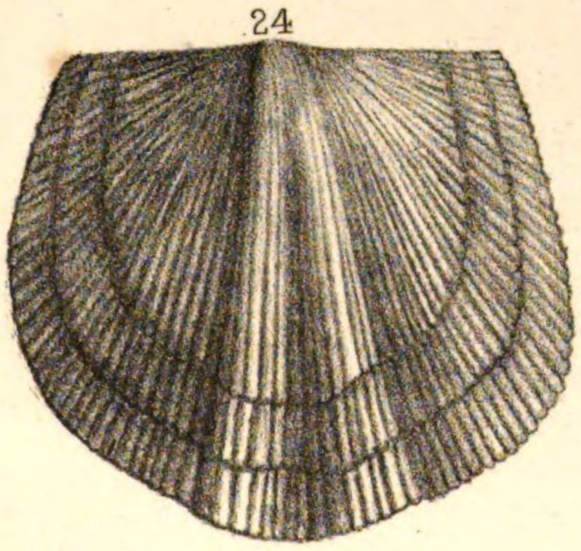
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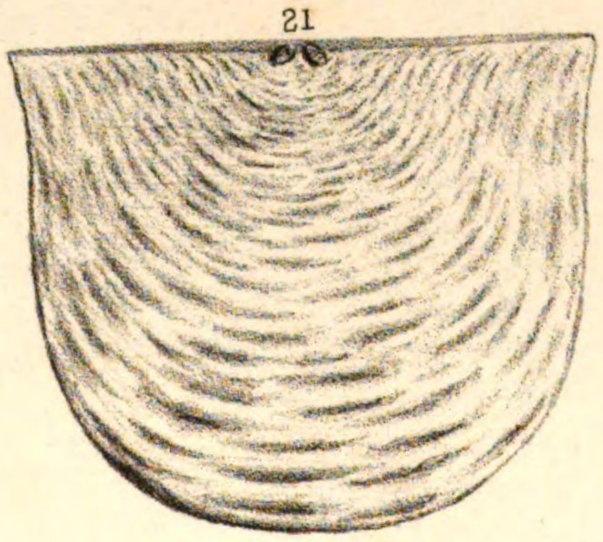
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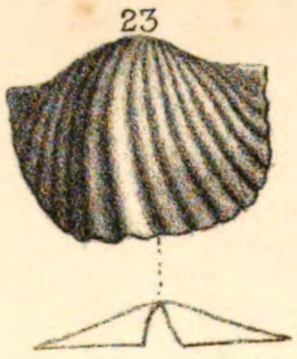
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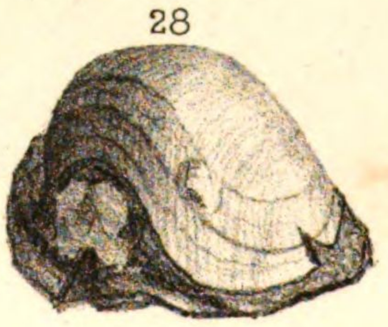
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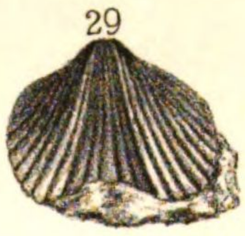
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EXPLANATION OF PLATE IV.

Fig. 1.—TIRESIAS INSCULPTUS. *M'Coy.* (Page 43).
Upper figure natural size; lower figure magnified.

Fig. 2.—REMOPLEURIDES PLATYCEPS. *M'Coy.* (Page 44).
Upper figures natural size.

Fig. 3.—TRINODUS AGNOSTIFORMIS. *M'Coy.* (Page 57).
Upper figure natural size.

Fig. 4.—HOMALONOTUS OPHIOCEPHALUS. *M'Coy.* (Page 53).

Fig. 5.—HARPES (?) MEGALOPS. *M'Coy.* (Page 54).
Upper figure natural size; lower figure, cleared specimen, magnified, margin imperfect.

Fig. 6.—OTARION OBTUSUM. *M'Coy.* (Page 54).
Upper figure natural size; lower figure magnified; middle figure, granulation highly magnified.

Fig. 7.—ACIDASPIS BISPINOSUS. *M'Coy.* (Page 45).
Upper figure natural size; lower figure magnified; the rough dotted line represents the cephalothorax rather too short in proportion to the width.

Fig. 8.—LICHAS PUMILA. *M'Coy.* (Page 52).
Upper figure natural size; lower figure magnified.

Fig. 9.—LICHAS LAXATA. *M'Coy.* (Page 51).
Very small specimen, natural size.

Fig. 10.—SPHÆREXOCHUS CALVUS. *M'Coy.* (Page 44).
All the figures natural size.

Fig. 11.—FORBESIA LATIFRONS. *M'Coy.* (Page 49).
The lower figure of cephalothorax magnified.

Fig. 12.—CALYMENE ARENOSA. *M'Coy.* (Page 47).

Fig. 13.—PORTLOCKIA SUBLÆVIS. *M'Coy.* (Page 51).
Upper figure natural size; lower figure slightly magnified.

Fig. 14.—CALYMENE FORCIPATA. *M'Coy.* (Page 48).

Fig. 15.—ENCRINURUS STOKESII. *M'Coy.* (Page 46).

Fig. 16.—ECHINOSPHÆRITES GRANULATUS. *M'Coy.* (Page 59).
Left hand figure, portion of specimen, shewing the plated ovarian opening and plated conical mouth *in situ*, natural size; right hand figure, half of spherical specimen, shewing the pedicle of attachment, natural size; middle figure, portion of weathered surface magnified.

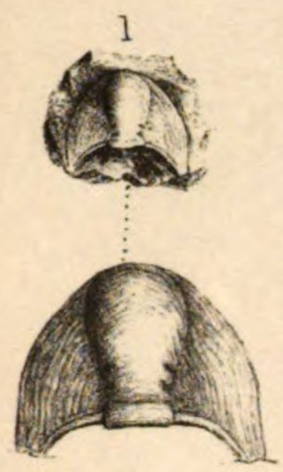
Fig. 17.—PETRAÏA ZICZAC. *M'Coy.* (Page 60).
The indenting of the plates in the lower magnified figure hardly angular or regular enough.

Fig. 18.—PETRAÏA QUADRATA. *M'Coy.* (Page 60).

Fig. 19.—PORITES MEGASTOMA. *M'Coy.* (Page 62).
Right hand figure, portion of specimen, natural size; left-hand figure, portion of surface magnified (by the error of the lithographer the large tubes are represented with more than twelve rays).

Fig. 20.—SYRINGOPORA (HARMODYTES) LONSDALEIANA. *M'Coy.* (Page 65).

Fig. 21.—FAVOSITES PETROPOLITANA VAR. LYCOPODITES. *Emmons.* (Page 64).
Left hand figure, base; right hand figure, section, both natural size; middle figure, magnified openings of the tubes on the surface.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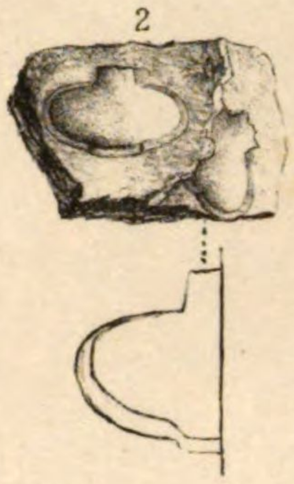
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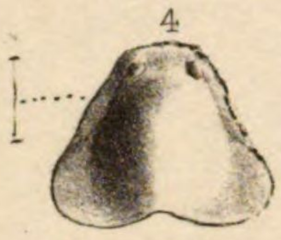
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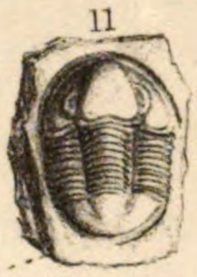
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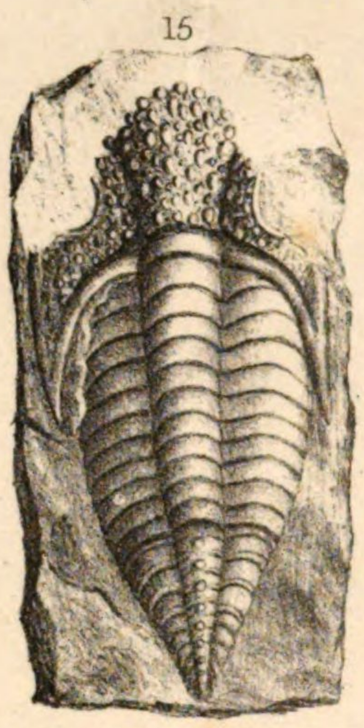
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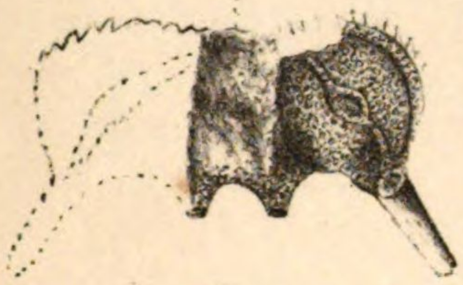

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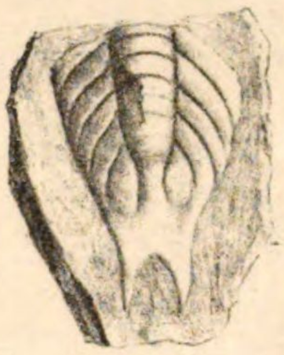

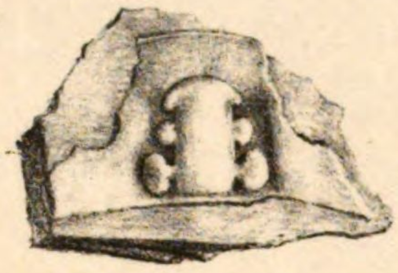
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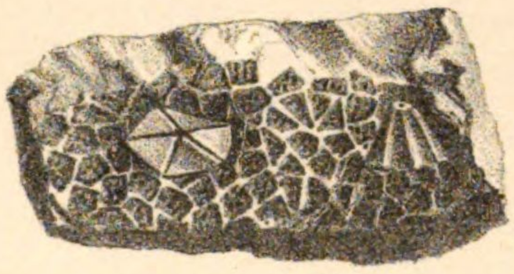

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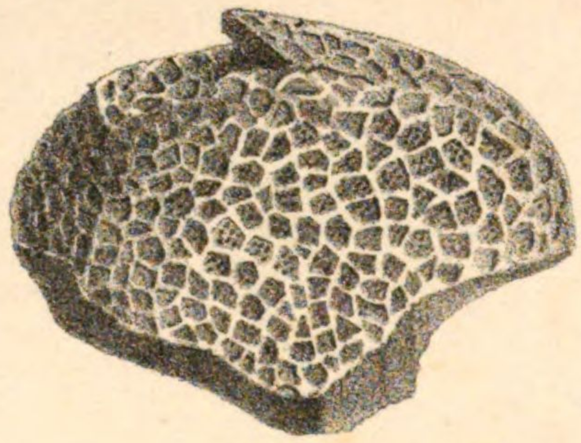

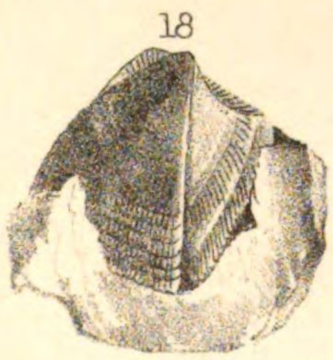
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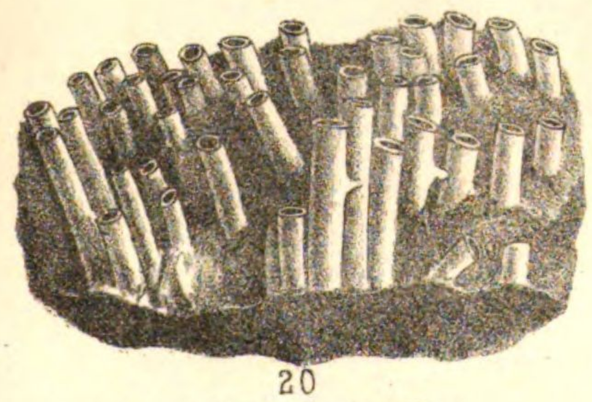
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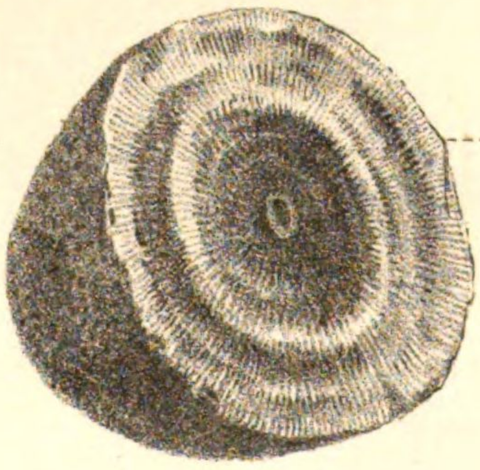

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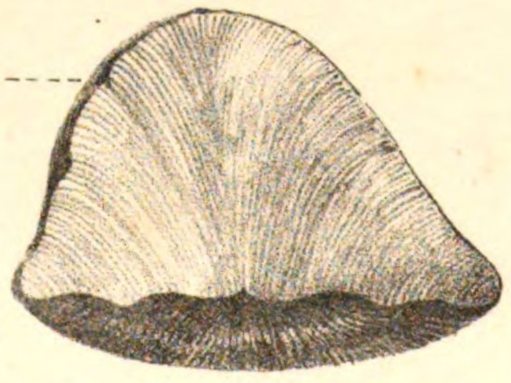

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EXPLANATION OF PLATE V.

Fig. 1.—ORTHIS (?) APPLANATA.

a. Natural size.
b. Cast of the inside of the flatter valve, magnified.
c. Do. outside of the same valve, do.
d. Do. inside of the convex valve, do.
e. Do. outside of the same, do.

Fig. 2.—ORTHIS REVERSA. (*Natural size*).

a. Cast of the inside of the most convex valve.
b. Do. inside of flatter valve.
c. Side view of convex valve, below which is a portion of the outer striated surface.
d. Same valve as "*a*," but a flatter variety.
e. Supposed variety, deeply depressed in the front.

Fig. 3.—ORTHIS FALLAX. (*Natural size*).

a and *c.* Less convex valve, raised in front; cast of inside.
b. The other valve, concave in the front, and a portion of outside.
d. Cast of a portion of the flatter valve, magnified.

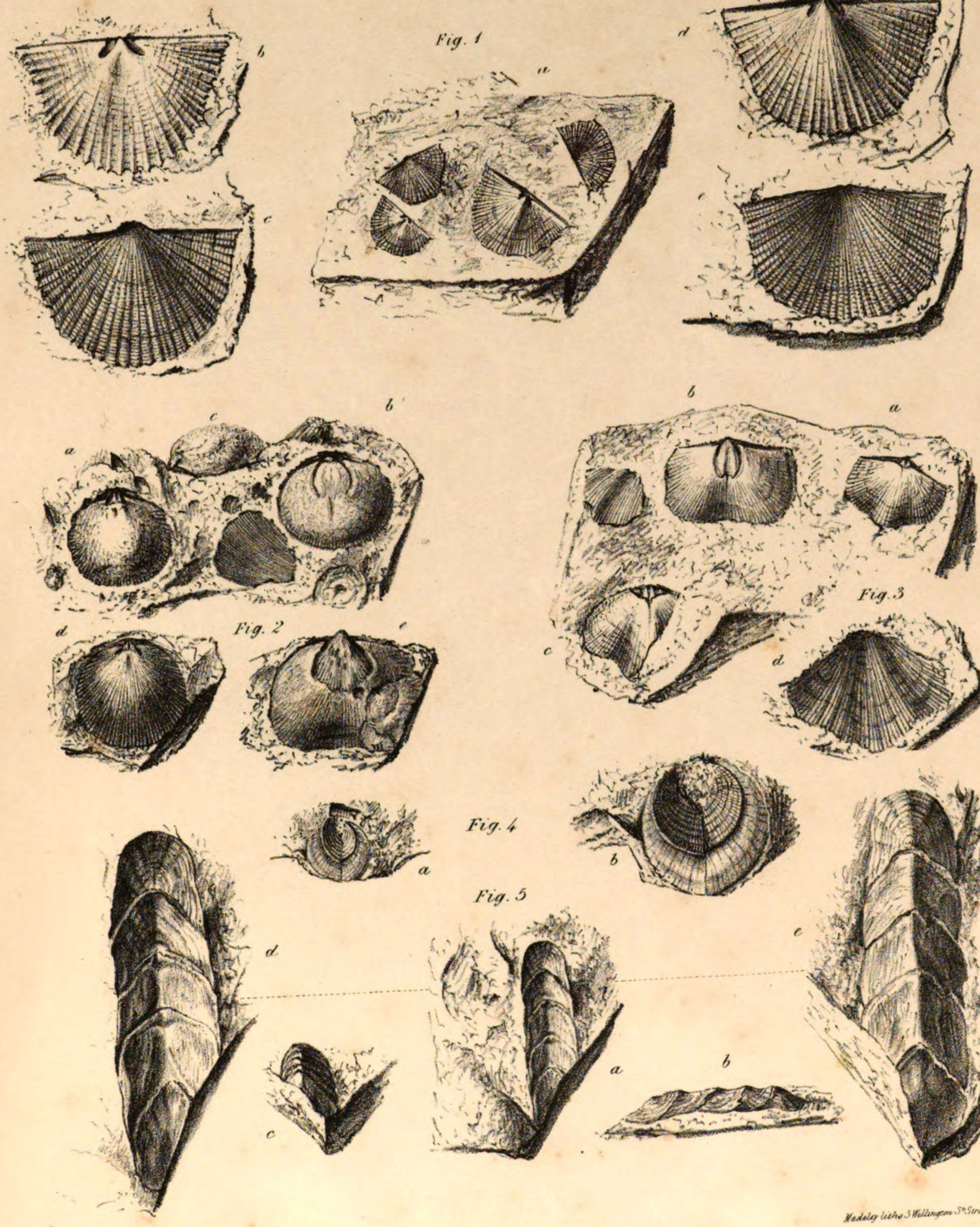
Fig. 4.—PLEURORHYNCHUS PRISTIS.

a. Natural size.
b. Magnified.

Fig. 5.—HELMINTHOCHITON GRIFFITHII.

a. Cast of the outer surface.
b. Do. inner surface, side view.
c. Do. do. end view.
d. Do. outer surface, magnified.
e. Do. inner surface, do.

Plate V.



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A synopsis of the Silurian fossils of Ireland Prepared by Frederick M'Coy from the collections made from the several districts examined by Sir Richard Griffith, as at present laid down on his geological map of Ireland: with descriptions of some additional species by J. W. Salter. With five

London, (Leipzig) 1862

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